

REVIEW OF PRIZE ESSAYS, 1887.

(MOUNTAIN ARTILLERY).

BY

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In the following pages it is proposed to give a short *resumé* of whatever information of value is to be found in the essays submitted for competition for the R.A. Institution Gold Medal in 1887, and to note briefly such of the suggestions contained in them as seem to offer subjects for discussion.

The committee appointed to carry out this idea have abstained from expressing an opinion on many of the various points raised, and the proposals are generally left to speak for themselves. It has been found necessary to pass by without notice a considerable portion of the detail given in the essays, principally for want of space, but partly because many of the minor proposals are not of great importance, and partly also, because in the latest equipment many of the proposed alterations have been introduced.

The subject given, viz., "Mountain Artillery, its Organization, Equipment, and Tactics," produced six essays, none of which, except that to which was awarded the Gold Medal, were published in the R.A.I. papers.

It is much to be regretted that a subject, full of interest to many officers in the Regiment, should have elicited so few essays and so little novel information concerning the practical working of existing Mountain Batteries. It cannot be possible that these six essays fairly represent the experience of all the numerous officers in the Regiment who are qualified to write with authority on the subject, and it is most unfortunate that the opportunity of collecting much valuable information for the guidance of those, who are striving to put in order the chaos of mountain organization and equipment now in existence, has been lost.

"*Fier mais sensible*"¹ remarks with truth that "no kind of battery, be it Horse, Field or Heavy, requires more practical training and more carefully selected officers, men and animals, to make thoroughly efficient for service, than a Mountain Battery," and yet we are, or at all events, until very recently have been, content hastily to organize, as occasion has demanded, scratch Mountain Batteries out of any material that came first to hand, and in which officers, N.-C. officers, and men, had while on active service to learn the first rudiments of their work.

¹ The writers, with the exception of the Prize Essayist, are referred to throughout by the mottoes they adopted.

It certainly speaks well for the energy of our officers and their power of adapting themselves to circumstances, that under such conditions they should have acquitted themselves creditably, and the shortness of the campaigns in which our home army has of late years been engaged has, fortunately or unfortunately, prevented the shortcomings of such a system from being exposed to view.

Much of the unsatisfactory equipment that has been introduced into our service, and is now so difficult to eliminate, owes its origin to scratch Mountain Batteries. It is however to be hoped that the extravagant waste and unsatisfactory results of such a system have now been recognized, and we must believe that our poverty and not our will consents now to our home army remaining without some sort of Mountain Artillery organization.

The organization required for Mountain Batteries of the home army must differ materially from that adopted for Mountain Batteries in India; the latter has been brought to a high pitch of perfection, and will serve us in many respects as a model, but the more varied requirements of the former, the different conditions of service, and many other points make it necessary to introduce considerable modifications.

Let us start with the understanding that we are discussing the organization and equipment of genuine Mountain Artillery, which has nothing to do with elephant, camel, or coolie transport. The means of locomotion for the true Mountain Battery are, *par excellence*, the mule, supplemented, sometimes even, as in the Russian service, entirely supplanted by the pony.

The proper business of the Mountain Battery is to fight amongst the mountains, though, as is recognized by the essayists generally, it is frequently called upon to fight in sandy plains, in dense jungles, or in any country where wheeled Artillery is unable to move; it is true that elephant transport is often used to carry guns in the hills, camel transport in the plains, and coolie transport in dense jungles, but batteries so organized do not come under the head of Mountain Artillery, and it is in our opinion outside the intended limit of the subject for the essay, to enter, as have some of the writers, into their organization.

It also appears to be going somewhat beyond the intended scope of the essay to discuss whether the place of Mountain Artillery should be with the Divisional or Corps Artillery; that is a point of army organization, and, provided the batteries are forthcoming when required for service, it is a matter of little moment to what portion of the army they are attached; the theatre of war and the class of warfare to be expected at any particular phase of a campaign would probably decide the question at the time.

The question of the brigade organization of Mountain Artillery being a purely regimental question, might however, have been discussed within the limits of the subject. Mountain Artillery can only be regarded as a branch of Field Artillery, Field Artillery, that is, in its widest sense, and the stumbling block of conservative tradition, the idea that "any change, however beneficial, is to be deprecated," can alone account for its continued existence as an abnormal formation of Field or Garrison Brigades.

This question is hardly referred to in any of the essays; Captain White, the writer of the Prize Essay, considers "the question of the organization of Mountain Batteries in a brigade as a purely administrative one, and possibly beyond the scope of the essay;" he gives, however, the details of an establishment for a *depôt* battery of Mountain Artillery, which, it is to be presumed, is intended to be a Mountain Brigade *depôt*; this *depôt* is to supply drafts for batteries abroad, and in time of war is to be converted into an ammunition column; the proposed establishment is reasonable, but the conversion into an ammunition column is open to question; a *depôt* must, of necessity, be more required in time of war than at any other time for the purpose of filling up the gaps created by casualties and sickness in the batteries in the field.

"*Per ardua ad alta*" advocates the formation in England of a *depôt* with regimental transport consisting of about 20 men and 60 mules under a N.-C. officer. This *depôt* is to be transferred from one Mountain Battery to another, as required on change of station, and, when not so employed, to be utilized for the instruction of other batteries and other branches of the service in packing tents, kits, &c., &c. The "substantial working pay" which he proposes for the men of his *depôt* would hardly compensate for the difficulties they would have to contend with.¹

"*Pour y parvenir*" proposes four *depôts*, two in England, one in Scotland, and one in Ireland. Each *depôt* consisting of a Major, Captain, two Subalterns, two Staff Sergeants, three Sergeants, 12 Gunners as limber gunners, and 50 Drivers, with six guns and 120 mules; these *depôts* are to act as training *depôts* for teaching the Garrison Artillery in their neighbourhood Mountain Artillery work, and the men so trained are to be drafted to Mountain Batteries in time of war. This arrangement makes no adequate provision for the training of drivers, would in time of war reduce still further the available numbers of our already insufficient Garrison Artillery, and would, it is to be feared, produce indifferent Mountain Artillery, as the training is only to last for six months.

"*Quid rides*" advocates the formation of a Mountain Artillery Brigade with a *depôt* in England, but gives no details, except that it should recruit and train up to a strength of 10 per cent. of the batteries in the brigade.

He also strongly advocates the formation of a *depôt* in India for the Native Batteries, and points out that in the recent war in Burmah the batteries left in India were drawn upon to so great an extent to fill the vacancies caused by sickness in the batteries on service as to be practically rendered unfit for service. This is unquestionably a forcible argument in favour of the formation of such a *depôt*.

The establishment at present laid down for a Mountain Battery in

¹ This writer makes a suggestion, which, though outside the subject of the essay, is worthy of consideration, viz., that a section of the C. and T. Corps at home should always be provided with pack equipment.

the Imperial army is based generally on the Indian organization, and is consequently on a very complete and somewhat lavish scale. It is adapted for service in a difficult country where wheeled traffic is impossible, and is so arranged that "each division is complete in itself and capable of marching alone, detached from the battery at a moment's notice without any special preparations."¹ There are many possible theatres of war for Mountain Artillery where this organization might be modified with advantage and economy; it therefore becomes necessary to find for home service a peace establishment which is capable of development for war according to the requirements of the country where the battery may be called upon to serve.

Captain White goes very fully into this question, and, starting with a peace establishment, gives four tables showing the increase of establishment necessary under different conditions in order to place a battery on a war footing; he commences by pointing out that in "our service alone of all the Mountain Artilleries of Europe is a relief line considered necessary" the 1st line mules being relieved in foreign Mountain Artilleries by the use of shafts or poles. The question of shafts and poles for Mountain Batteries will be discussed further on under the heading of "Equipment," but here we may note that if their introduction enables a battery to do without a relief line, there will be a consequent reduction in establishment which will contribute both to economy and efficiency.

The introduction of shafts or poles not being yet decided on in our service, Capt. White proposes for a peace establishment that the 2nd line mules of a battery should be saddled as a relief line, and that the load of each should consist of two sets of line gear and two boxes, each containing four rounds of ammunition, and calculates that this load will not exceed 132 lb. This calculation does not appear on examination to be correct; the lightest line gear load according to the Hand-book of the 2.5-in. R.M.L. (jointed) gun is about 69 lb.; the heaviest (that of the relief wheel mule) about 105 lb.; the weight of eight rounds of ammunition will bring the light load up to 137 lb. and the heavy one to 173 lb.; to these weights we have still to add the weight of the boxes, fuzes, and various small stores, for which 28 lb. will certainly not be an excessive estimate.]

The lightest load will therefore apparently be at least 165 lb., and the heaviest not less than 201 lb. Apart from the fact that this is an excessive load for a *relief* mule, there are objections to such a system, not the least of which is the serious inconvenience of hampering ammunition boxes with bundles of line gear.

"*Per ardua ad alta*" proposes for a home establishment, ammunition mules and relief mules in alternate sub-divisions, or three relief and three ammunition mules in each sub-division, the muzzle and breech, carriage and ammunition, and wheel and axle cradles (*i.e.* for the 2.5-in. gun) being made interchangeable; although it is not so stated, this proposal probably applies to a peace establishment only, as it only allows the very inadequate total of 48 rounds per gun.

¹ Hand-book for Field Service. Vol. I. p. 24.

"*Pour y parvenir*" proposes a gun of 240 lb. in one piece (which will be discussed under "Equipment") instead of the 2·5-in. jointed gun, and gives comparative tables of the establishments required, showing for his proposed gun a very considerable reduction in both men and mules; in some of his reductions, however, he loses sight of the principle that each division of a Mountain Battery should be complete in itself; moreover, in his calculations he includes reserve ammunition, but omits carriage for it. He considers that the establishment for a battery on home service should be 100 all told, exclusive of drivers.

Captain White and "*Celer et audax*" consider that for baggage the employment of light carts instead of pack mules is an advantage as well as an economy, where the nature of the country will admit of their use; the former advocates, for the peace establishment, that partly carts and partly pack transport should be provided so that the men may be taught the adjustment of baggage loads on pack animals; a very important point in their instruction, and one that is seldom sufficiently attended to.

"*Pour y parvenir*" recommends what is called in India the "half Kabul scale" of regimental transport, which enables a division or half-battery to turn out complete at once as for war establishment.

Either of these arrangements appears to be good; probably the mixed establishment of carts and packs, as being more capable of development into a war establishment to suit any sort of country, is preferable.

The remaining essays do not enter into the subject of an organization specially for home service.

The conclusion to be drawn appears to be that for a battery on home service we should have a peace establishment on as low a scale as is compatible with efficiency, which is capable of development for war according to the requirements of the country where the battery may be called upon to serve; also, that for war the number of mules should be reduced, the ordnance mules by a change in the system of relief for the 1st line, possibly by the introduction of shafts or poles, and the baggage mules by the substitution of light wheeled carts where the theatre of war will admit of their use. The consensus of opinion is in favour of the normal establishment of officers, N.-C. officers and men remaining without material alteration, except such as would follow from the adoption of any of the proposed alterations of system.

It is not always quite clear whether the proposals of the various essayists are meant to apply to an organization for home or for Indian service, or for both. Possibly, in many cases, the changes advocated are intended to apply universally, though it is not so stated. The suggestions above referred to as to method of carrying ammunition, relief lines, shafts, &c., apply with equal force to both services, as do also some of those that follow.

"*Pier mais sensible*" advocates an increase in the establishment of men and mules, the regular training of a certain number of men as

signallers, an increase in the number of mules carrying reserve ammunition, and the addition of an officer to act as Quartermaster.

"*Per ardua ad alta*" considers that every battery should have on a peace establishment a sufficient number of mules to turn out in bivouacking order, and that as many additional animals as are required to complete it to war establishment should be on the spot and available, though temporarily employed for transport purposes; he also considers that there should be more ammunition with the 1st line.¹

"*Celer et audax*" advocates the introduction in Mountain Batteries of a warrant officer as "Conductor of Stores," who shall be on the footing of a "Departmental Official" without executive command, so that he may not clash with the Sergt.-Major or native officers.

"*Pour y parvenir*" gives very complete details of the baggage to be carried on service, which do not differ materially, allowing for difference of establishment, from those laid down in the new Hand-book for the 2.5-in. R.M.L. gun. The scale of allowance of baggage for officers is slightly reduced, and that for European N.-C. officers and men increased; he allows for the carriage of more stores, but does not include rations or water, the latter being in India carried by mules, extra to the establishment. For the native establishment he advocates carrying a mule-load of spices in case suitable food should not be procurable.

"*Quid rides*" advocates the employment of grass-cutters' ponies, which he would make Government property, as baggage animals, and to fill up casualties on active service, or as an alternative plan that Batteries in India should keep in peace time their full establishment of Regimental Transport, and that these mules, and their drivers, or muleteers, should be employed for grass-cutting purposes; he considers that on service grass-cutters and their animals are rarely needed for their legitimate work, and are "generally speaking, useless."

He considers that there should be four native officers, viz., one soubadar and three jemadars in every Native Battery in order to prevent the friction that arises from the soubadar doing the same duties as the jemadars. He also advocates the increase of the office establishment of Native Batteries, and the substitution in European batteries of a native officer for the Havildar-Major.

As noted by Captain White, baggage mules of Mountain Batteries are in certain parts of India replaced by carts, one two-wheeled cart being issued in place of six baggage mules. This is however only a temporary arrangement, and the normal form of transport for Mountain Batteries in India is pack transport.

The question whether there should be four or six pieces in Mountain Batteries is touched upon by Captain White and "*Celer et audax*;" the former notes that there is a strong opinion amongst many officers that for tactical considerations a Mountain Battery should not exceed four pieces; and suggests that, for the sake of these considerations and

¹ Capt. H. C. C. D. Simpson, R.A., in his "Reply to Prize Essay," published in the 14th Number of Vol. XV. of the R.A.L. papers, gives as his opinion that "the 2nd ammunition mule should form part of the 1st line."

economy, the battery should, as in the Russian service, consist of eight pieces with a staff of officers consisting of one Major, two Captains, and four Subalterns; the economy of this plan is not quite apparent on calculation; the latter considers six gun batteries preferable, on account of the necessities of internal organization.

There does not appear to be any valid argument in favour of a change in the ordinary number of pieces which form the *administrative* unit in our service, except the reduction of the length of a column amongst the hills; it is possible that, when Mountain Batteries are armed with the 4-in. R.M.L. jointed howitzer and the proposed 10-pr. gun, it may be advisable, considering the necessarily large increase in the number of ammunition mules, to reduce the number of pieces in a battery in order to bring the establishment within manageable proportions, but the same argument does not apply so forcibly to existing batteries. Most Mountain gunners will probably agree that the division is the *tactical* unit in purely mountain warfare, and that except for the reason mentioned above, we should be guided by administrative reasons in determining the strength of a Mountain Battery.

There is very little mention made in any of the essays of the organization for an ammunition column for Mountain Artillery. Captain White suggests converting his proposed *dépôt* into two Artillery and one Infantry ammunition column, but gives no details for his somewhat unpractical proposal. "*Per ardua ad alta*" doubts whether an ammunition column would be advisable, as the field arsenal would be very far away; this would appear to be a decided argument in favour of an ammunition column.

The very complete system laid down in the Russian service with all the details for the flying park, mobile park, and local park¹ is worthy of the attention of the Mountain gunner.

It is a relief to find one point in which all the writers are agreed; Mountain gunners should be "exceptionally fine men;"² they should be specially enlisted and accustomed to hill climbing. Such men can unquestionably be found in sufficient quantities in the United Kingdom for our modest requirements, and, for Native Mountain Artillery, in the Punjab. Drivers and muleteers can be obtained for our Indian batteries locally without difficulty; for this purpose "*Celer et audax*" recommends that more attention should be paid to the enrolment of Hazaras and Muzbee Sikhs, since Goorkhas, the perfect type of the muleteer, are not procurable in sufficient numbers; muleteers for our home batteries can be procured from Malta, Cyprus, Egypt, Gibraltar, or locally where required for service. The drivers for our batteries at home, if specially enlisted as such, would be a difficulty, as they would not be required on relief of Indian batteries under the existing organization in that country. The majority of the writers recognize this difficulty, and recognize also that it would be impossible to find men willing to enlist as Mountain Battery drivers at the existing

¹ These details are to be found in the Russian Hand-book.

² Prize Essay.

drivers' rate of pay, considering the hard and unattractive nature of the work that would be required of them.

"*Pour y parvenir*" advocates tempting men to enlist by a high rate of pay; "*Quid rides*" proposes that there should be no particular standard of height, and that the driver establishment should always remain in England; Captain White would make gunners and drivers of Mountain Batteries at home interchangeable so that the latter could be made available for drafting to India as gunners. On the whole this last scheme would appear to be the simplest solution of the difficulty; practically there is no reason why a Mountain Battery driver should be of the ordinary Field Artillery driver pattern; in fact as a man of whom much is required, both as to power of marching and duties in camp, he should be tall, active, strong, and a good walker.

With regard to mules Captain White tells us that the *beau-idéal* of an ordnance mule is an animal 14 hands high with a girth of 67 inches, while for baggage and transport purposes a less powerful animal with a minimum height of 12½ hands suffices.¹

There are various suggestions in the essays as to the procuring of mules when required, none of which call for remark; but "*Celer et audax*" gives us the following possibly useful hint as to the treatment of restive mules; in order to load a restive mule he recommends placing a steady mule or horse opposite to him so that their nostrils touch; from personal experience he believes this plan to be infallible.

In considering whether the existing and proposed patterns of mountain ordnance are satisfactory, it will be well to begin by stating generally the conditions they are required to fulfil.

Our Mountain Artillery may be called upon to serve either in a mountainous country, roadless plains, or jungles. In either it may be opposed to a well-armed foe, provided with artillery and long range

¹ The instructions for the guidance of officers purchasing mules, issued by the Indian Government, are excellent. The following is a summary of them:—

1. The back of the mule should be straight from withers to croup.
2. An arched back is better than a hollow back.
3. High withers are bad; a high croup worse.
4. Cow hocks are not objectionable.
5. Action should not oscillate the back; a short step in walking is preferable to a long swinging stride.
6. The hocks, which are a frequent source of disease, should be carefully examined.

The average price is from £8 to £20.

Scale of height, age, and girth measurement.

Height.	Age.	Girth.	Height	Age.	Girth.
14 hands 1 inch ...	6	66	13 hands 2 inches ...	6	62
" " ...	5	65	" " ...	5	61½
" " ...	4	63½	" " ...	4	61
14 hands ...	6	64	13 hands 1 inch ...	6	61
" " ...	5	63½	" " ...	5	60
" " ...	4	63	" " ...	4	59
13 hands 3 inches ...	6	63	13 hands — ...	6	60
to ...	5	62½	" — ...	5	59
13 hands 2 inches }	4	62	" — ...	4	58
			&c. &c.		
			Lowest height, 12 hands 2 inches. }		

Artillery.

Transport.

rifles, or to badly armed, semi-barbarous hordes. To deal successfully with the first class of foe, amongst the mountains, we should have a low velocity gun or howitzer with considerable shell power, but if our fighting ground is in the plains, or even on the lower slopes of mountain ranges, a high velocity gun with effective shrapnel is required. Against the lower class of enemy, similar but less powerful weapons would, under similar circumstances, suffice.

Captain White thinks that the 2.5-inch R.M.L. jointed gun, at present the most powerful mountain gun in the world, fulfils, as far as possible, the requirements of a high velocity mountain gun; but, recognising the fact that in many phases of mountain warfare curved or high-angle fire is required, he suggests that a second breech portion, consisting of a steel block containing a small chamber, should be supplied for each gun, that a light pair of trunnions should be fixed on the chase portion, about half way between the muzzle and the junction nut, and that thus the chase portion should become convertible into a small gun of about 240 lb. weight, for firing reduced charges with the same shell as the 2.5-inch proper. Even if this idea, which he himself considers "chimerical," could be carried out, the result would be a most inefficient weapon, taking into account the small bursting charge of the common shell with its present bursting charge of gunpowder. Failing this, Captain White advocates the formation of howitzer batteries, for which he would select a weapon in two pieces, each weighing about 200 lb., and carrying a shell of 12 to 14 lb. in weight; he would retain the 7-pr. R.M.L. gun of 200 lb., for light batteries and service where the enemy is badly armed.

Captain White expresses a doubt whether, in the new 20-pr. howitzer in three pieces, which has recently been introduced in the service, and the 10-pr. gun, also in three pieces, now undergoing trial, the correct limit of the number of parts into which a gun may be divided has not, from the point of view of risk of disablement, been exceeded. Some of our experts in gun manufacture consider that the system of a divided inner tube is faulty in principle; but limited as we are both as to weight and length of load for a single mule we must, if we are to possess a powerful gun or howitzer for mountain service, be content to accept these drawbacks as inevitable.

"*Per ardua ad alta*" considers the 7-pr. gun of 200 lb. unsuitable for service against an enemy armed with modern small-arms on account of the short effective range of its shrapnel shell.

"*Celer et audax*" considers the 2.5-inch R.M.L. gun a good low trajectory gun, but inferior to the 7-pr. R.M.L. of 200 lb. for shelling villages at short ranges, or firing at an enemy under cover; he advocates the introduction of a howitzer that can be mounted on the same carriage as the 2.5-inch R.M.L. gun, carrying the same ammunition and double shell in addition. Each battery is to have six of these pieces, and would therefore contain in itself, without additional carriages, both a gun and a howitzer battery; "beds" for these howitzers can, he suggests, be carried, if necessary, with the ammu-

nitition reserve. The extreme length of shell that could be usefully employed with a howitzer of 2·5-inch bore, and twist of rifling at the muzzle similar to the gun of that calibre, would be less than $1\frac{1}{2}$ inches longer than the existing 2·5-inch common shell, the bursting charge of which is only 4 oz.; the same objection therefore, even if double shell were introduced, applies to this proposed howitzer, that has before been mentioned in speaking of Captain White's "chimerical" howitzer, viz., that it would be practically useless, on account of the small bursting charge of the common (or double) shell. It is probable that the value of Mountain Artillery will be increased, ere long, by the adoption of one of the various forms of "high explosives."

"*Pour y parvenir*" remarks that the 2·5-inch R.M.L. gun is suited for Mountain Artillery service in sandy, wooded, or enclosed countries as an auxiliary to Horse and Field Artillery, but on account of its low trajectory and small shell power is not adapted for service in a mountainous country; he objects to it on account of its want of mobility, its delicacy, and liability to injury, and proposes a steel gun in one piece, sighted centrally, length 50 inches to 54 inches, weight 240 lb., calibre 3 inches at least, muzzle velocity 1100 f.s., weight of shell 9 lb., maximum charge 1 lb. 2 oz., reduced charge 8 oz. or 9 oz. for use when the gun is used as a howitzer. It is open to question whether it would be possible to obtain sufficient accuracy from such a gun, but in any case the limit of weight of metal for one load is exceeded.

"*Quid rides*" considers the British Museum the only suitable place for the 7-pr. R.M.L. gun, and advocates arming all batteries of Mountain Artillery, whether European or Native, with the best jointed gun of 400 lb. that it is possible to produce.

It appears then, to sum up, that in the 7-pr. R.M.L. jointed gun of 200 lb., we have a mountain gun that is suited for service in the mountains against a badly armed foe, though in many respects an indifferent weapon; and in the 2·5-inch R.M.L. jointed gun of 400 lb., a good mountain gun that is suited for warfare, where a low trajectory is an advantage, and that may be useful as an auxiliary to Horse and Field Artillery against a well-armed enemy, though for this purpose we still require a more powerful weapon; this want will probably be supplied by the introduction of the 10-pr. gun in three pieces; to oppose a well-armed enemy in a mountainous country we shall shortly possess the 20-pr. R.M.L. jointed howitzer.

The 15-pr. R.M.L. jointed gun is alluded to by "*Pour y parvenir*" as the 3·3-inch howitzer; there is only one battery of this nature of piece in existence; it started in life as the 3·3-inch jointed howitzer, but was a failure in that capacity; it subsequently became a low velocity gun, and its name was changed accordingly; but it is unlikely that any more will be manufactured, and it need not be included in reckoning our available mountain guns.

The carriages of our mountain guns are approved of by the writers generally; amongst some minor improvements suggested, Captain White proposes an elastic link at each end of the check rope, in order

to reduce recoil by rotating the wheels in a contrary direction as the spring recovered from the shock of discharge; the idea is plausible, but it is doubtful whether the spring would act until the conclusion of the recoil; he proposes also a method of adjusting the axletree with fixed clip-plates which is worthy of attention. The same writer mentions the ingenious folding carriage, invented by Major Clavarino of the Italian Army, with approval; it is conceivable that this carriage is only adapted for a low velocity gun, and that the buffer would fail to check the violent recoil of such a gun as the 2.5-inch R.M.L.; on this subject he also alludes to the folding carriage adopted for the 20-pr. R.M.L. jointed howitzer; this highly ingenious invention forms a most compact and portable load; it has recently broken under trial at Shoeburyness, but the accident is probably due to an easily remedied fault in the construction.

"*Pier mais sensible*" recommends an increase in the diameter of the wheels in order to give greater command in firing; increased command would perhaps be an advantage, but the weight of the 2.5-inch wheel is at present at a maximum for transport.

"*Per ardua ad alta*" rightly considers these wheels too heavy, and suggests lightening the wheel load by removing the elevating gear to the carriage; the effect of this would be to make the carriage load excessive; probably the solution of the difficulty will be found in the introduction of lighter wheels, which is now contemplated.¹

"*Pour y parvenir*" advocates the adoption of the carriage invented by Lieut. Birch, R.A., and attributes its failure on trial to its being used with the 2.5-inch R.M.L. gun, having been designed for the lighter 7-pr. R.M.L.; it was tried at Shoeburyness on the 9th December, 1884, and the report on the trial states that "its chief defect is want of stability, and that owing to its being fitted with trucks instead of wheels, the labour of moving it by hand was very great"; it was found after the trial that one arm of the bracket had given way during practice; this result is not surprising, since it was designed for a much lighter gun than that with which it was tried, but as the carriage as designed weighs 220 lb., it is difficult to see how it would be possible to obtain sufficient strength and stability in a similar carriage for the 2.5-inch R.M.L. gun, without exceeding the limit of weight for a single load; for it must be remembered that one of the merits claimed for this carriage is that the whole of it forms but a single mule-load.

This writer's suggestion, that the axletree should be carried in a "stirrup working like a swivel on the top of the front arch" and in two clips on the top of the hind arch, so that it could be placed in the "stirrup" from the side of the mule and then slewed round into its proper place is good. With the present arrangement there is a little awkwardness in adjusting the axletree on the top of the cradle.

The principal objection taken to the ammunition of the mountain guns now in the service, is the smallness of the bursting charge of the 2.5-inch common shell. This, without doubt, is a serious defect.

¹ A pair of wheels weighing 158 lb., i.e., 57 lb. less than the present service pattern, has lately been tried at Shoeburyness with satisfactory results.

Captain White proposes to remedy this by using a steel shell, or a more powerful explosive for a bursting charge. Several of the writers, speaking from experience, state that the bullets of the 2·5-inch shrapnel shell do not scatter on burst, "*Pour y parvenir*" declaring, that he has found the bullets after firing lying in a heap on the ground. The improvements in the later patterns of this projectile have been directed towards remedying this defect.

There is considerable difference of opinion as to the merits of star and double shell; the conclusion to be drawn appears to be that these projectiles have their merits on occasion, and for that reason, that it would be inadvisable to withdraw the existing patterns. A double shell for the 2·5-inch R.M.L. gun would, however, for the reason previously given, be of little value. A defect in the 2·5-inch star shell is not noted in any of the essays, viz., that on account of its length it cannot be carried in the ordinary ammunition boxes.

"*Per ardua ad alta*" criticizes rather unfavourably the time and concussion fuze, of which Captain White and other writers approve; the time and percussion fuze has now been substituted in the 2·5-inch equipment. The lifters both for gun and carriage are criticised unfavourably by many of the writers, and it is true that they are in some respects unsatisfactory; no form of lifter has yet been introduced which is not in some way open to objection; the drawbacks to the chase-lifter with fid and ring are noted by Captain White, but this probably is the simplest and handiest yet proposed; the method now adopted in India of using the handspike as a carriage lifter and the sponge-stave as a muzzle bearer,¹ has the great advantage of reducing the number of stores to be carried.

"*Celer et audax*" suggests a plan for carrying a small supply of water in the field which, he says, has been adopted by the native cavalry in India—a water skin is made in the form of a double leather girth, and attached loosely round the animal's belly to the girth tabs; he calculates that in this manner about 1½ pints per officer and man could be carried in a Mountain Battery. The amount that could be carried depends of course on the dimensions of the double girth, which he does not give; it is possible that the system might be usefully applied with Indian leather; the flavour of English cured leather would probably make water so carried useless for drinking purposes.

"*Quid rides*" advocates, with sound sense, the lightening, as far as possible, of all articles of equipment, and the assimilation of as many as possible with those used in other branches of the service.

A comparison of the weights of some of our stores with the corresponding stores in foreign mountain artilleries leads to the belief that considerable reduction might, without loss of efficiency, be made in the weight of our loads.

It is generally admitted in the essays that our saddlery is excellent

¹ There has hitherto been much confusion between the terms "lifter" and "bearer"; in the Mountain Handbooks recently drawn up, the following distinction has been adopted:—a "lifter" is used to lift either gun or carriage from both sides, by two or more numbers; a "bearer" is placed in the bore for lifting.

of its kind, and has but one defect, its excessive weight. Captain White alleges that the ordnance cradles made in England are from 10 lb. to 12 lb. heavier than those made in India; this difference is principally caused by the use in India of leather straps for side-arms and small-stores where possible, instead of iron fittings as in England, and there can be no doubt that the Indian system is the better of the two; it is most important to reduce "useless" weight in every possible way that is compatible with efficiency, in order to be able to add to "useful" weight; with this view Captain White suggests the use of steel instead of wood as a material for the ordnance cradles. The use of steel for cradles has often been advocated, but up to the present time it has not been possible to procure a trial. The excessive weight of the pannels is also noted in many of the essays, and Captain White on this point calls attention to the pannel in use in the Austrian Service, which is considerably lighter than ours, and is "quilted" all over, and divided on the inner side horizontally, in order to prevent the stuffing from shifting. If this form of pannel can be used without producing sore backs, it is certainly much superior to our clumsy arrangement. The arrangement of breeching and hip straps, without a crupper, in use in the Austrian and Russian Services, is also noted favourably in the Prize Essay. Captain White speaks favourably of the circular bit as a substitute for the bridoon, whereas, "*Pour y parvenir*" condemns the circular bit as not giving sufficient control over a mule. The Pelham bit and hunting saddle are generally condemned except by Captain White. Probably these articles would be suited for Mountain Batteries, if a better pattern were introduced into the service; in the English equipment the regimental patterns of saddle and bridle have for the present been adopted.

"*Per ardua ad alta*" would substitute waterproof mail canvas for leather in the manufacture of ammunition boxes.

Those writers who touch on the subject of range-finders agree in condemning the Watkin range-finder for use in the mountains, but, except by "*Pour y parvenir*," who recommends the Weldon range-finder as "sufficiently accurate, quicker, and less likely to get out of order," no suggestions are made.

The importance of correct signalling in Mountain Batteries is rightly insisted on by the majority of the writers, who consider that, besides flags, heliographs and night signalling apparatus should form part of Mountain Battery equipment.

Kits, baggage and tents are treated of at considerable length in some of the essays, and the writers agree as to the necessity of reducing all impedimenta of this kind to a given standard which must not be exceeded. "*Celer et audax*" considers that baggage should be divided into light and heavy, the former comprising reserve ammunition (*sic*) and marching order kit only, and the latter blankets, extra clothing, and tents, so that when necessary, a battery may be able to reduce considerably its length of column, without serious inconvenience. Captain White on this point goes even further, and proposes that what practically amounts to a light marching-order kit,

should be carried on each man's person. As a temporary arrangement this plan would be excellent, and would to a great extent, remove one of the principal objections to Mountain Batteries when marching on narrow hill paths, viz., the inordinate length of column; but there does not appear to be any good reason why the mountain gunner or driver, whose work combines the duties of the cavalry and infantry soldier, should have to carry his kit under all circumstances.

There is considerable difference of opinion expressed in the essays on this point, but the balance is in favour of the retention of the arms now forming part of the equipment with the exception of the sword belt and Martini-Henry sword bayonet, for which it is considered better to substitute the old mountain battery pattern,¹ or Sam Browne belt, and the curved sword formerly issued to Mountain Batteries in India, or a straight sword somewhat longer than the sword bayonet. Two writers advocate the introduction of shields; "*Pour y parvenir*" proposes that a shield should be carried in the relief line in each sub-division; he gives a diagram of this shield, which is to be made of $\frac{1}{4}$ -inch steel, and divided vertically into two parts, each part being hinged in the middle so as to fold for packing; when fixed for action the two parts are to be bolted together, and the whole shield attached by projecting arms to the points of the axletree outside the wheels, for which vertical slots are cut; he calculates that a shield so constructed, measuring 50 inches \times 40 inches, would weigh 140 lb., and considers that it would be necessary to provide an extra mule in each sub-division for the shield load. The other advocate for shields gives us no details.

The vexed question of "draught" in Mountain Batteries is hardly mentioned except in the Prize Essay.² "*Celer et audax*" does not approve of the use of shafts, but gives no reason for his disapproval. Opinions of English mountain gunners are still divided on this question, though the system has apparently found favour in the eyes of every nation, except England, that possesses a Mountain Artillery.

The whole question appears to be so simple, when divested of the many irrelevant issues that have been inserted, that it is hard to discover on what grounds there is so much controversy. It is true, as Major de Lautour in the February number of the R.A. Institution Papers states, that the "pioneers of the Mountain Artillery service—Batt, De Budé, Hughes—decided that as the only roads in India, suitable for draught, were in our own territory, it was distinctly not advisable that men or officers should accustom themselves to use their guns in a way they would not on service, and that if more mules were required, either to replace casualties or to carry baggage, it would be far wiser to recognise the fact, and have that number of mules additional, than to allow batteries to be exercised in peace in a way they would not be in war, and that therefore shafts were not a desirable

¹ This belt is recommended by a Mountain Artillery Committee which has lately been sitting in India.

² Captain White's short article on "Draught in Mountain Batteries, published in No. 10, Vol. XV, R.A. Institution papers, originally formed part of his essay.

portion of the equipment"; but this argument is based on the assumption that any number of mules is forthcoming, and that Mountain Batteries will never be called upon to serve in any theatre but a mountainous country. With all respect to the gallant and able officers mentioned, it is possible that they never imagined that Mountain Artillery would have to serve in such a country as Egypt; and it is possible to imagine many theatres of war for British troops, where a system of draught for Mountain Artillery could be applied with advantage. The advantages of such a system appears to be—

1. The economy in wear and tear and number of animals.
2. The facility, with a jointed gun, of moving, or coming into action without the delay of limbering-up or unlimbering.

Captain White's claim for "enhanced mobility on roads or open country" is open to question, and may be dismissed.

To counterbalance the obvious advantages, we have the increase and complication of equipment, and the possible loss of proper training for Mountain Artillery work both for men and mules. The latter objection is more imaginary than real; it would not be difficult to frame orders that would prevent any such loss of proper training. There is, moreover, another question which has lately occupied the minds of Mountain Artillery officers, and which, in a great measure, depends on the possibility of applying a system of draught to mountain carriages. The *late* Sir Charles Macgregor, in his essay on "Mountain Warfare," notes that there two kinds of mountain warfare:—

1. Operations necessary to pass a single range of hills, and
2. Operations which are proper to mountainous country.

If Mountain Artillery were called upon to operate in Europe, it would probably engage in operations of the first kind; the principal fighting would generally take place after passing the hills, where it would find itself opposed by Field Artillery of heavier calibre than any Mountain Artillery we now possess. But, with a system of draught we might possibly introduce a more powerful gun which might be transported to the field of operations, on the backs of mules, across a limited range of mountainous country, and could revert to wheel transport, when the obstacle of the intervening range was passed, so as to be able to cope with ordinary Field Artillery.

There would in fact be two kinds of Mountain Artillery,—(1) a light Mountain Artillery whose normal method of transport would be "pack," with possibly an alternative system of "draught," and (2) a heavy Mountain Artillery whose normal method of transport would be "draught," with an alternative system of "pack." We have, however, yet to find a suitable mountain shaft or pole; a pair of cumbersome shafts was recently made in the Royal Arsenal, and subjected to a short and fairly successful trial, but their weight was prohibitory; a design for a pole with a currie bar, of a pattern similar to that proposed by Captain White in his Prize Essay, but taking the bearing

on the centre of the cradle instead of the front, was also submitted, but up to the present has not been acted upon.

In discussing the tactics of Mountain Artillery, Captain White advances the opinion that in marching, a Mountain Battery can be depended upon to cover $3\frac{1}{2}$ miles in the hour, and "*Fier mais sensible*" agrees with him; now this rate might possibly be maintained for a short time on a fairly level and good road, but for ordinary mountain marching is excessive, and any calculation based on such an assumption would certainly be misleading; as Captain White, quoting Colonel Paquié, says,—“distances in mountain warfare are measured by hours—by length of time—it is difficult under these conditions to form a precise idea of the speed of the march in miles.”

“*Celer et audax*” recommends that the trot should be practised by Mountain Batteries as a pace of manœuvre, but in this proposal is strongly opposed by Captain White and “*Fier mais sensible*.” Considering the great weights carried by many of the mules, and the tendency of the worst loads, viz., the top loads, to “swag” even at a walk, it would appear to be undesirable to trot, except on extraordinary occasions.

This writer also suggests that, in order to obtain greater tactical mobility, the gun detachments should be mounted on the “relief” or “bare-backed” mules, and should lead the 1st line mules, in rapid movements, over short distances. With this view he would substitute, where possible, the Otago pack saddle for the wooden cradle. He recognises however the impossibility of substituting an Otago saddle for any of the gun or carriage cradles, and would reduce the inconvenient angularity, as a seat, of these cradles by means of a folded blanket. He does not make any suggestion as to the disposal of the mules, whose drivers would, in these rapid movements, be left behind, when the battery comes into action.

With reference to the position of Mountain Artillery on the march, Captain White would place them as near the head of the column as possible, with due regard to their safety.

“*Fier mais sensible*” in considering the position on the march of the Artillery of a Mountain Division, for which he recommends a special organization, places a Mountain Battery near the head of each of the three Brigades, and the Divisional Artillery, consisting of two batteries, in rear of the leading Brigade. He is in favour of always sending forward mountain guns with the advanced guard, and would even increase the number, in order “to open out defiles more quickly.”

“*Pour y parvenir*” considers that for advanced and rear guards in a hilly country Mountain Artillery possesses great containing power.

“*Quid rides*” places Mountain Artillery in rear of the main body of the advanced guard, except when there is road making to be done, when it should march with the main body of the column.

There is, no doubt, much to be said in favour of Artillery accompanying the advanced guard of a column among the mountains, and, in the face of all these opinions, it is dangerous to advance an opposite view; but the difficulty of finding positions where the guns can co-

operate with and support the advanced guard without exposure to the enemy's sharp-shooters on the flank, and the fact that mountain warfare is, as Captain White remarks, "a war of surprises," leave it perhaps an open question, whether it is advisable to detach the guns from the main body of the column, unless the flanks are known to be clear.

The majority of the writers assert the necessity for strong escorts for Mountain Artillery, and the difficulty of protecting it in a defile; Captain White recommends that the gunners and drivers should carry pistols for self-protection, and "*Quid rides*," for the same purpose, recommends carbines.

On the question of so arming gunners and drivers, there is at present great diversity of opinion in the Regiment, and there is no unanimity on this point amongst mountain gunners.

It is generally held by modern writers who have seen most of war, that Artillery only requires a special escort, if it is detached from other troops.

It has been noted that there are two kinds of mountain warfare:—

- (1.) Operations necessary to pass a single range of hills.
- (2.) Operations which are proper to mountainous country.

In considering the tactics of Mountain Artillery, we may put aside its abnormal employment in level, but roadless countries, where it must necessarily conform to the ordinary rules of tactics, modified perhaps slightly by its inferior mobility and the limited range of its guns.

In both the above-mentioned cases, the duty of Mountain Artillery will generally be to assist those flanking operations which are the essence of war amongst mountains, and, except on rare occasions, to clear the way, by turning movements over routes impracticable for wheels, for the advance by the main routes of more powerful Field Artillery. It is almost an axiom of mountain warfare that there is no position amongst the hills that cannot be turned; but, as a rule, the turning movement must be made by mountain paths only accessible to Infantry and Mountain Artillery. Instances of the success of such movements are frequent in the history of mountain warfare, such as Ochterlony's attack on the Bicheeahkoh Pass in Nepal, in 1814; St. Cyr's attack on Barcelona, over the mountains of Catalonia in 1808; Lecourbe's attack on the Austrian position on the Grimsel in 1799, and many others in that campaign. A later and very interesting case was the passage of the Balkans by a mixed force of about 12,000 men in July, 1877. A mere sheep track, sometimes overhanging precipices, was made passable for guns by two squadrons of Cossack pioneers, sent in advance. Two of the guns actually fell over a precipice, and in one case, a gun hung over a tree, the carriage being on one side, the horses on the other. They were, however, recovered. The mountain guns only were able to come into action when the head of the column debouched from the Pass, opposed by the Turks. The

result of the movement was that the main Turkish positions were turned and the Shipka Pass captured from the rear.

At the commencement of such operations, Mountain Artillery would usually form part of a detached column, but in the subsequent operations in the valleys, or lower slopes of the hills, would act in combination with the other kinds of Field Artillery, and as noted in many of the essays, its action would become subsidiary.

Such then being, in our opinion, the chief functions of Mountain Artillery, we have to consider the tactics to be pursued under such conditions, and to examine the ideas bearing on these phases of mountain warfare, which are contained in the essays.

Captain White, in discussing the 1st case, *i.e.*, when Mountain Artillery is acting with a detached column, merely notes that, in such operations, which he describes as "purely mountain warfare," the "number of guns is usually limited," and "the regulation of fire must be extremely strict," in order that there may be no waste of ammunition where the difficulties of transport are so great.

"*Fier mais sensible*" remarks generally that Mountain Artillery can support Infantry more closely than ordinary Field Artillery, because it can go wherever Infantry can, and that, in mountain warfare, the 1st Artillery position is, owing to the nature of the ground, as a rule, closer than usual to the enemy's position. He considers that turning movements should pivot on Artillery. Probably in mountain warfare, where turning movements are generally made by a detached force, the occasions for using guns as a pivot with advantage are rare.

"*Per ardua ad alta*" gives us a sketch of a road through a defile, in which he selects the projecting angles of the road, as it follows the conformation of one side of the valley, for the correct position for Artillery in action.

"*Pour y parvenir*" considers that Mountain Artillery is particularly suited for the attack and defence of defiles.

For the tactics of the 2nd case in which Mountain Artillery can play a useful part, *i.e.*, in the more extended operations in the valleys and lower slopes of mountain ranges, we find in the Prize Essay some useful and generally sound ideas; the author's "strong defensive position" is however open to the objection that the Artillery of the defence at *A* will be firing at a considerable angle of depression without sweeping the ground in front of the position, until its fire is masked by its own infantry, and that the attacking force can advance completely under cover to within 900 yards of the Infantry position at *B*.¹ The advantage of firing salvoes, too, is under any circumstances, extremely doubtful.

We may gather from the essays, that in the attack and defence of defiles, in which the operations now under consideration principally consist, Mountain Artillery plays an important part, but what that part should be, is not very clearly defined. Lieutenant (afterwards

¹ The part of the Prize Essay referred to in this paragraph was not printed in the R.A.I. papers.

Major-General Sir Charles) Macgregor in his essay on Mountain Warfare, points out that, for the attack of a defile, the first thing is, to turn the enemy's position; he lays down as a rule that in mountain warfare you should never attack in front when the position can be turned, and as has been before remarked, it is rarely that a position amongst mountains cannot be turned; with this object he recommends that Artillery should be used to occupy the enemy's attention in the defile, while crowning parties ascend the heights. The range at which the guns should come into action must depend in a great measure on the conformation of the ground; as "*Fier mais sensible*" points out, Artillery can, by reason of the facilities for obtaining cover amongst the hills, advance, as a rule, to closer positions than usual before opening fire, and, in fact, is often compelled to do so. The defence of a defile should be carried out on similar principles; the heights must be occupied by Infantry, and the defile defended by Artillery.

The following points which bear on the employment in the field of Mountain Artillery are noticed in the essays.

"*Per ardua ad alta*" and "*Pour y parvenir*" call attention to the advantages of Mountain Artillery for night marches and attacks, on account of its silent movement, and the latter writer notes that it can be rapidly and silently embarked in and disembarked from boats where rivers have to be crossed; he also credits it with superiority to ordinary Field Artillery in the defence of villages, because it can be placed in positions inaccessible to heavier guns and can be more easily concealed.

We have endeavoured to extract, as far as possible, within the limits of a necessarily short article, the pith of the essays. If the omission of any points which are worthy of attention, leads to further discussion on the subject of Mountain Artillery, the omission will be a distinct gain.

Even now, there is an inclination in the home service to regard Mountain Artillery as an Indian product, and its organization as outside the requirements of European service. But, even if, as the writer of a recent article in the R.A.I. papers, with whom however we cannot agree, says, "Mountain Artillery is never likely to be wanted for active service in Europe," we are sure, sooner or later, to be again involved in small wars, such as those in which our home army has during past years been frequently engaged, and in which there has invariably been a demand for Mountain Artillery, and a clear understanding of its requirements in organization and equipment, will surely help us to avoid the mistakes into which we have often fallen, and may even result in the substitution of a permanent and reasonable system for the make-shift arrangements that have hitherto found favour.

SIGNS AND MARKS ON MILITARY STORES.¹

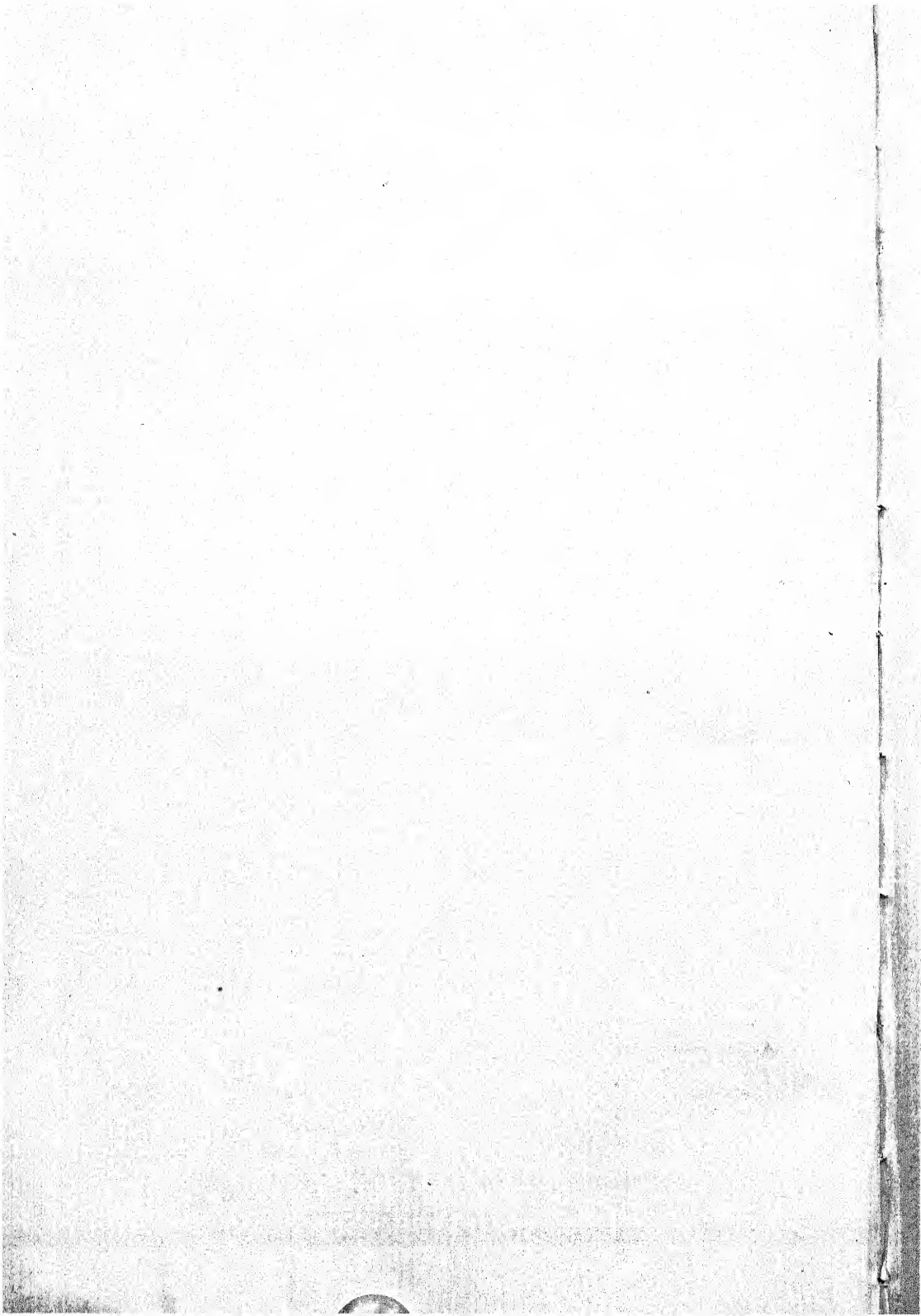
ROYAL GUNPOWDER FACTORY.

Sign or Mark.	Signification.
F.G.	Fine grain.
R.F.G.	Rifle fine grain.
R.F.G.²	do. do. (For Martini-Henry Rifles.)
M.G.¹	Machine Gun (Nordenfelt.)
L.G.	Large grain.
R.L.G.	Rifle large grain.
R.L.G.²	Introduced to supersede R.L.G.
R.L.G.³	Powder made in India for R.M.L. guns, 25-pr. to 80-pr.
R.L.G.⁴	Powder for medium guns, for which R.L.G. ² is too quick.
Q.F.¹	Quick-firing (Hotchkiss.)
P.	Pebble.
S.P.	Selected Pebble.
P.²	Cubical 1½" Pebble.
E.X.E.	Extra experimental.

¹ Continued from p. 494, Vol. XV., R.A.I. "Proceedings."

Sign or Mark.	Signification.
S.B.C.	Slow-burning Cocoa.
R.G.P.F.	Royal Gunpowder Factory.
B.L.S.A.A.	Breech-loading Small-Arm Ammunition.
	All grained powder not made up into cartridges is packed in barrels, and all made, or repacked at Purfleet; since January 1885, is placed in waterproof bags inside the barrels, which when so packed, contain 100 lbs. of L.G. R.L.G. or any fine grained powder, 125 lbs. P. or P. ² and 110 lbs. of R.L.G. ² If there is no waterproof bag they hold 120 lbs. R.L.G. ²
N (red)	Barrels and cases marked thus are intended for Naval purposes.
	Marks on end of powder barrel.
N (red)	For Naval purposes.
Gunpowder.	
110 lbs.	Weight.
WALTHAM ABBEY.	Place of manufacture.
R.L.G.⁴ (red)	Description of powder.
APRIL 1888.	Date.
BAG WATERPROOF, 1	With waterproof bag.
LOT 2835.	
TR 28.	Tare weight of barrel.

Sign or Mark.	Signification.
<p>GUNPOWDER</p> <p>100 lbs.</p> <p>WALTHAM ABBEY.</p> <p>PRISM¹ BROWN (white)</p> <p>JUNE 1887.</p> <p>LOT 26.</p> <p>TR 44$\frac{1}{2}$</p>	<p>Marks on top of case.</p> <p>Cases for Prismatic powders not made up into cartridges are used for carrying and storing 100 lbs. of gunpowder.</p> <p>The outsides of the cases are painted red.</p>
<p>GUNPOWDER</p> <p>PRISM¹ BROWN (red)</p> <p>lb.</p> <p>WALTHAM ABBEY.</p> <p>Date of manufacture</p> <p>/ /</p> <p>LOT No.</p> <p>No.</p> <p>TARE lb.</p>	<p>Marks on paper label at end of case.</p> <p>Cases for gunpowder are lined with zinc, coated with black lacquer, and measure :—</p> <p>$29\frac{3}{4}'' \times 15\frac{1}{2}'' \times 9\frac{1}{4}''$</p>
<p>WALTHAM ABBEY.</p> <p>GUNCOTTON WET</p> <p>9 oz. PRIMERS</p> <p>No. 72</p> <p>GROSS WEIGHT lb.</p>	<p>Marks on top of case.</p> <p>Cases for guncotton are lined with tinned copper, having a closing plate about 13 inches long, soldered down after the case is packed. The cases contain 50 lbs. guncotton wet, and measure :—</p> <p>$28\frac{3}{4}'' \times 12\frac{1}{2}'' \times 8\frac{1}{2}''$</p>



THE RELATIVE IMPORTANCE OF MOBILITY AND SHELL FIRE IN THE FIELD ARTILLERY.

BY

CAPTAIN F. G. STONE, R.A.

Pro Patriâ.

The Silver Medal Prize Essay.

ARRANGEMENT OF THE SUBJECT.

- I. Mobility: its meaning; the considerations which affect it are of two natures:—1. Tactical and administrative. 2. Technical. Discussion of these considerations and extent to which improvement may be effected under the various heads. Influence of mobility on the fighting value of Field Artillery under various conditions.
- II. Shell Fire: its constitution: influence on the fighting power of Artillery.
- III. Summary: Relative Importance of Mobility and Shell Fire, and dependence of the latter upon the former: deductions.
- IV. Appendix.

“HE who has the address to bring suddenly and unknown to the enemy, an unexpected amount of Artillery to bear upon the most important points, is sure to carry them.”—*Napoleon.*

In order to obtain the great results of which Field Artillery is capable, it is necessary to bear in mind that whereas a superior shell fire is the end to be kept in view, that end can only be attained by a high degree of mobility: without such mobility it soon lapses into a mere auxiliary arm, and ceases to occupy its proper position in the tactical dispositions for the fight. The Field Artillery may indeed “fairly claim to be the *regulator of a battle*, and we should utterly undervalue the power of this important arm, if we regard it merely as an auxiliary arm to the Infantry.”¹

It will be advisable to treat the question of *Mobility* distinctly from that of *Shell Fire* in the first instance, and subsequently draw such conclusions as appear justified with regard to both.

¹ von Schell.

I.

Definition of
Mobility.

Mobility may be defined as—the power of bringing Artillery into action in such a manner and at such a time, as to employ every available gun to the greatest possible advantage, and thus assert our superiority over the enemy at decisive points and at critical phases of an action. Prince Kraft remarks that—“If Artillery is to fulfil its duties and always carry them into effect at the right moment, it is urgently necessary that it should be at hand when wanted.”¹

Considerations which
affect Mobility.

The considerations which affect the question of mobility are of two natures :—

I. Tactical and Administrative.

II. Technical.

Tactical and
administrative
considerations.

The former include :—

- a. Distribution of Batteries to Divisions and Army Corps.
- b. Position of Batteries on the line of march.
- c. Relations of command and assumption of the initiative by subordinate Commanders.
- d. Issue of maps to Battery Commanders.
- e. Exercises of Artillery in time of peace.
- f. Establishment of trained horses on a peace footing, and its possible expansion to a war footing.

Technical
considerations.

The latter include :—

- g. Method of draught employed.
- h. Mounting of gun detachment.
- k. Weight behind the teams.

Tactical and Administrative considerations discussed.

Distribution
of batteries.

Establishment of
a Division.

Establishment of an
Army Corps.

a. The establishment of a British Division is fixed with a view to rendering it tactically and administratively complete; the allotment of three field batteries to seven battalions of infantry and one regiment of cavalry satisfies all requirements under this head. In an Army Corps, there are more complex requirements to meet, of which the necessity for having a strong force of artillery, independent of that attached to the Infantry Divisions, and immediately under the hand of the Corps Commander, is paramount; this force is called the Corps Artillery, and consists of three horse and two field batteries; we have then altogether three infantry divisions each with three field batteries, one brigade of cavalry with one horse artillery battery. The Corps Artillery with three horse artillery and two field batteries, giving a total of four horse and eleven field batteries.

The above proportions are founded principally on the experience gained in the campaigns of 1866 and 1870, and appear to be satisfactory; the question is one of great importance, since on it depends

¹ “On the Employment of Field Artillery in connection with the other Arms.”—Prince Kraft *zu Hohenlohe Ingelfingen*.

that equal distribution of duties, and clear perception of what those duties are, so essential to the harmonious working of the military machine, and without which it is impossible for the artillery to be in sufficient force at the right time and in the right place in order to strike a decisive blow, and thus achieve the maximum effect with its shell fire with the minimum waste of ammunition.

b. A comparison of the results achieved by the Prussian Artillery in 1866, and the German Artillery in 1870-71, shows clearly the importance of assigning a forward position to batteries on the line of march. In the former campaign the Prussians seldom succeeded in bringing more than one half of the number of guns into action, which the Austrians were able to oppose to them, owing principally to their position in rear of the marching columns; in fact, the Prussians seemed to look upon their artillery as a sort of reserve, but they were quick to profit by the lessons which that campaign taught them, and the following instructions were issued for subsequent guidance:—"The Artillery of the Division will march at the head of the column, with one or more battalions in front; the Corps Artillery is not to be allowed to march too far in rear, and in the case where the reserve cavalry marches in advance of the main body, the Corps Artillery may march in front of the infantry."¹ This radical change in the order of march bore its fruit in 1870, the German guns generally succeeding in establishing a decided superiority over the French artillery before their (*i.e.*, the German) infantry had changed from the order of march to the order of battle. It is only thus that the mobility of Artillery can be turned to full tactical account, as von Schell writes:—"If we arrange our columns of march so that the batteries shall be as near as possible to the head of the main body, they will be at the immediate disposal of the Commander for despatch to the front."

Position of
batteries on
the line of
march.

c. It is laid down in our regulations that the O. C., R. A., and his Adjutant form part of the Staff of a Division, and that in an Army Corps, the O. C., R. A., with his Brigade Major and A.D.C., form part of the Head-Quarters Staff. It is the duty of the O. C., R. A., to give such information as may be required, about his own arm of the service, and to make such suggestions as may be called for, and having received his orders from the General to transmit them with such additions of detail as may be advisable to his subordinate Commanders. In extensive operations where it is absolutely impossible for subordinate Commanders to grasp the whole situation, it is especially desirable that no initiative be taken by them, either in commencing or breaking off an action; such assumption of the initiative at once impairs the mobility of the arm, and discounts the value of a combined plan of action; this, however, should not prevent the said Commanders from using every means in their power to obtain a correct view of the general situation, and by acting upon it, endeavour to bring their batteries at a rapid pace, as near as possible to the point where they are most likely to be required; thus anticipating any orders they are likely to receive, so far as is compatible with not committing themselves

Relations of
command.

Assumption
of the initia-
tive.

¹ Prince Kraft "On the Employment of Field Artillery in connection with the other Arms."

to any definite action. "If the deployment" says von Schell "has not been completely decided upon, one can nevertheless form a very fair idea as to where it will take place." A good Commander will sometimes save hours in this way, and will earn for his batteries the reputation of being *always at hand when wanted*; whereas a too impetuous Commander, by committing his batteries to an action at the wrong time or in the wrong place, may jeopardise the success of an engagement. Nevertheless, circumstances will not unfrequently occur which may render it imperative on a subordinate Commander to assume the initiative on his own responsibility; sometimes even, but very rarely, in opposition to superior orders; in such a case he must be prepared to give good reason for his action; the cases in which a subordinate Commander can be justified in withdrawing his guns from action without superior orders must be of very rare occurrence.

After a definite objective has been assigned to a battery or group of batteries, the officer commanding it should not be hampered by precise instructions as to *how* it is to be attained. The General should give his orders clearly, and leave the executive officers to carry them out intelligently, with the aid of such special information as it may be the duty of the staff to supply. Von Schell remarks,—“The batteries should not receive any particular order to accompany the attack; as a general principle they should always accompany it, only it is necessary to let them know when it is going to commence.”

d. In the Franco-German war, all Battery Commanders were supplied with maps, with the result that:—I. Roads or zones of country could be definitely assigned to batteries on the line of march, and clearly marked by their Commanders in their own maps. II. At the commencement of an engagement, batteries could be directed to any point on the field, from any other point however remote, with every probability of avoiding entanglement with the enemy or with their own troops, until the desired point was reached. III. Upon reaching their destination, the minimum of time was expended in taking up a suitable position. IV. Responsible officers could readily identify the positions taken up by the forces on both sides, within their own immediate sphere of action; an intelligent distribution of shell fire was thus facilitated. The incalculable gains to mobility thus obtained appear so palpable that it is unnecessary to enlarge upon them.

e. The exercises of a battery in peace time should conform as nearly as possible to the nature of the work required of it in time of war. Parade manœuvres are excellent up to a certain point, but must not be allowed to usurp the place of the less showy, but none the less necessary work of accustoming the teams to make rapid-forced marches, instructing the drivers in the art of keeping their horses in wind, and obtaining the maximum of work with the minimum of distress. It is not too much to say that a horse can do twice as much hard and fast work if driven judiciously, as it can get through if handled by bad or inexperienced drivers. Moreover, the officers require constant practice in extended reconnaissance, concentrating from a distance upon required points, organising marches and counter-

Issue of
Maps.

Exercises of
Artillery in
time of
peace.

marches, and carrying out changes of direction, and taking up positions in combination with the other arms from instructions received while on the line of march. It is only by constant practice that work of this nature can be readily performed; it must be habitual, almost mechanical; no amount of theory can make up for want of practice under this head.

We must admit that few of the above points receive the attention they merit, but "if it is understood that the reputation of a battery depends in some measure on its shooting, and *its readiness for war from a war standpoint*, there will soon be improvement in these points."¹

f. Under this head military and economic considerations are apparently at issue; such a state of things however is illogical, and is due to our unique administrative system, and the exigencies of party strife, rather than to any natural antagonism existing between the two. A cheese-paring policy in time of peace, followed by inevitable disaster and loss of prestige in time of war, coupled with the lavish expenditure of millions, where thousands would have sufficed had preparation been made in time; this, can scarcely be called economy!

For perfect mobility at the commencement of a campaign, every battery should start with its full complement of trained horses, and a sufficient percentage of spare horses for each battery should be formed into a Field Depôt. It will be remembered that after the Zulu war, a large number of our cavalry and artillery mares were sold in South Africa; upon the outbreak of the Boer war many of our guns were practically *hors de combat*, on account of the absence of teams to draw them. The officers of N/5, R.A., were fortunate enough to secure a few horses which had previously been sold by a cavalry regiment, and thus horsed two of their guns, the remaining guns being dependent upon the inferior draught of the country. In the attack on Laing's Nek, these "two guns of N/5, R.A., were the rear guard and the last to leave the camp, but being more mobile and *better horsed* than the other guns, Sir G. Colley (after the force had crossed the river) ordered these guns up to the front and sent them on at a gallop."² Again, during the trying march of N/5, R.A., from Maritzburg to Newcastle, "the *English* horses worked admirably, there were no galls or horse sickness, which was rather remarkable, as horse sickness was prevalent everywhere."³

These instances are merely typical of the importance of a sufficient establishment of trained horses, and might be quoted by the score. Let us at once face the fact that success in war is out of the question, unless we can place a sufficient force of mobile Artillery in the field to hold our own from the outset; the rapid mobilization of armies in the present day puts the possibility of training men or horses for the commencement of a campaign utterly out of the question; it will tax all our resources to supply the inevitable waste which must occur during the campaign. In the Crimea the annual waste of

Establishment of trained horses, &c.

Boer War.

Laing's Nek.

March of N/5 from Maritzburg to Newcastle

Our position as regards trained horses.

¹ Lieut.-Colonel Fox-Strangways on "Field Artillery Progress," Vol. IX., R.A.I.

² Lieut. Parsons, Vol. XI., R.A.I.

³ Callwell's Prize Essay, R.U.S.I.

horses in all branches of the service was 80 per cent., and in the Franco-German war, the Germans re-horsed nearly the whole of their cavalry and a large proportion of their artillery: 'The smaller our force of artillery the greater the necessity that it should be ready for service; we have practically no reserves of men or horses to fall back upon, and a serious reverse would mean the annihilation of our army in the field; we have seen what this means on a *small scale* in South Africa and Afghanistan; in a *European Campaign*, it would mean the payment of an indemnity which would cripple us for a generation, and the dismemberment of the Empire! In modern warfare there is no place for artillery which has not sufficient mobility to fulfil its rôle in the fire-tactics of the day; *guns are of no use unless they can be brought into action*, and the artillery which is able to bring the largest proportion of its guns into action, is the one which most effectively contributes its share to the success of an engagement.

Our two
Army Corps

The country has been informed by its appointed Minister, that we have two Army Corps ready to go anywhere: let us examine in what this readiness consists in the case of the artillery. We will leave India out of the question, since in the event of serious European complications, it is more probable that we should have to send troops there, than be able to reinforce our army in Europe from that source, at all events, so far as the artillery is concerned such is likely to be the case. The following table shows the difference between our peace and war footing as regards horses:—

	Horse Batteries.	Field Batteries.	Peace footing. Horses per Battery.	War footing. Horses per battery.	Number of horses to complete per battery.	Peace footing. Total horses.	War footing. Total horses.	Total number of horses to complete war footing.
1st Army Corps... ..	5	—	104	186	82	520	930	410
—	—	13	86	138	52	1118	1794	676
2nd Army Corps	6	—	72	186	114	432	1116	684
—	—	11	74	138	64	814	1518	704
Lower Establishment	—	14	50	215	165	700	3010	2310
(Ammunition columns) ...	—	—	—	—	—	—	—	—
Total for two Army Corps	11	38	—	—	—	3584	8368	4784

The above Table includes dépôt batteries for training men and horses and forwarding them to the service batteries as required. It will be observed that the whole of the horse and field artillery is absorbed in this scheme, (i.e., all the batteries on the home establishment) leaving not one single battery for the defence of our own shores!

Colonel Ravenhill has estimated that we should require 19,000

horses over and above our present peace establishment, to enable us to place two Army Corps in the field; of these 4784 are required for the artillery alone, and a large proportion must be fit for hard and fast work. What probability is there of our obtaining these horses in the hour of need? General Brackenbury says,—“We have not got the horses nor the means of obtaining those horses with great rapidity in the case of war.”¹

It is believed by some, that there is nothing easier to improvise than horse draught; those however who have purchased horses for the artillery in peace time, know the difficulty of obtaining the raw material even under favourable circumstances; and we gunners know the training which the raw material requires before we should be willing to pass it as “fit for service,” considering moreover that we should have to train drivers and horses at the same time, we can scarcely escape the conclusion that our scheme of mobilisation is likely to prove abortive when the day of trial comes, as come it most assuredly will, notwithstanding our unreadiness to meet it.²

The necessity for having mobile ammunition columns to supply the batteries rapidly in time of war, has been admitted by all military authorities; the experience of the Germans in 1870, was that “the ammunition columns as a rule were not near enough,”³ and led to a re-organisation of this important department of supply: in our service the only provision for ammunition columns is the proposal to break up a fighting force of 14 batteries, and organise them for the purpose of ammunition supply, on the outbreak of hostilities! This proposal is of so astounding a character, that it seems possible that Parliament would grant the money for organising our ammunition columns on a peace footing,⁴ under the auspices of the Ordnance Store Department, and allow our batteries to do the work for which they are trained, if the facts were fairly laid before the House.

Our Ammunition Columns.

Technical considerations.

g. In our service shaft draught has been adopted in preference to pole draught, principally on account of the superior control which the wheel driver is thus enabled to exercise over the draught. On the other hand it may be urged in favour of pole draught:—I. That the harness is interchangeable throughout the team. II. The difficulty of rapidly replacing a disabled *shaft* horse, does not exist in the case of *pole* draught. III. The work is evenly distributed throughout the

Method of draught employ.

¹ The registration of omnibus and tram horses for the purpose of forming a transport train, and supplying the waste (roughly 40 per cent. per annum) incidental to service, is an excellent idea but the attempt to lead the public into the belief that such a system of registration can possibly supply our cavalry and artillery, at a few day's notice, with the carefully selected and highly trained horses which they require, and have a right to demand, can only be viewed with undisguised alarm by those who have the efficiency of the army and the welfare of the country at heart.

² The Report of the Royal Commission on “Queen's Premiums” with regard to our supply of half-bred horses, and the purchase of our best stallions and mares by agents of Foreign Governments, is of great interest. Quotations have been omitted for lack of space.

³ Hoffbauer.

⁴ “Our Ammunition Columns,” by Captain Harris, Vol. XXXI., R.U.S.I.

team, and there is no necessity for exceptionally powerful wheel horses. On active service there is little doubt that the advocates of pole draught have the best of the argument; and the Germans, who have had more experience of campaigning in the last 22 years than any other nation in the world, as well as being noted for their *thoroughness* in military matters, would most assuredly have adopted shaft draught if there had been any valid objection to the pole. The appearance of the unwieldy looking pole swaying about in an uncomfortable manner during rapid manœuvres over difficult ground is certainly a drawback from a parade point of view; but it does not interfere with efficiency from a war standpoint.¹

Mounting of
gun detach-
ment.

h. The French in 1870 had no axletree seats to their gun carriages, the detachment being mounted principally on the wagon or made to double along at the side of the gun; the consequent loss of mobility was much felt, and would have rendered offensive action, on the same scale as it was carried out by the Germans, an absolute impossibility. A high degree of mobility can only be utilized, when a sufficient number of men to serve the gun can be carried with it; in our own field artillery it is possible to carry five men on the gun carriage and limber, which together with the mounted No. 1, makes a detachment of sufficient strength to work the gun.

Weight
behind the
teams.

k. It may be accepted as an axiom that the heaviest gun should always be employed, which can be accompanied by a sufficiency of ammunition, and which can attain the requisite mobility demanded by the occasion. Thus, for instance, in the Zulu war "there is no doubt that all the divisions should have been armed with the 9-pr. M.L.R. of 6 cwt., as in Zululand the country is so easy for wheel traffic, that wherever the 7-pr. on the Kaffrarian carriage could travel, there also the 9-pr. could go."²

The weight behind the teams is practically a fixed quantity, depending upon the tractive force which can conveniently be brought to bear; the results of peace manœuvres, and the experience gained in recent campaigns, point to a maximum weight of about 1½ tons for horse or light field guns, and 2 tons for heavy field guns, these weights being increased in the field artillery by the weight of four and possibly five men of the gun detachment, though of course in cases of exceptional difficulty this additional load would not have to be reckoned with as a rule.

Leaving the detachments out of the question for purposes of comparison, let us consider in what relation our artillery stands with respect to that of other nations, in regard to the weight behind the teams and the weight of projectile in corresponding natures of guns. A reference to Appendix A shows that our weights are somewhat excessive behind the teams, and that we do not appear to obtain a corresponding gain in the weight of our projectiles. Thus the Russian 20·23-pr. has a weight of 2¾ cwt. less behind the teams than our 20-pr.; the French 17·6-pr. has also 2¾ cwt. less than our 16-pr.; while among

¹ See also Captain Jocelyn's Prize Essay, Vol. XI., R.A.I.

² Lieut. Slade, R.H.A., Vol. XI. R.A.I.

light field guns, the Russian 15·26-pr. has half-a-hundredweight, and the German 12·32-pr. more than 6 cwt. less weight behind the teams than our 12½-pr.; and finally our 9-pr., while throwing a lighter shell than any other light field gun, has a weight behind the teams considerably greater than that of the French, Austrian, or Italian light guns.

This state of affairs cannot be regarded as satisfactory. The 20-pr. is still in an experimental stage, and our light guns are being superseded by the 12½-pr., we shall therefore confine our remarks to the last named gun. Our latest improvements have all been in the direction of obtaining high muzzle energy from guns of comparatively light weight, thus our 12½-pr. has a muzzle energy per ton of metal in the gun of 726 foot-tons, our 20-pr.-628 foot-tons., while the nearest approach to this on the Continent is the French 17·6-pr., with 536 foot-tons of muzzle energy per ton of metal in the gun.¹ At first sight this might lead to the erroneous conclusion that we are much better off than our neighbours; a little consideration will show that this is not the case. A light gun with high muzzle energy, requires a heavy carriage, and a point is very soon reached beyond which it is found necessary to have more weight on the carriage than is necessary for mere strength: a comparison with the guns of other nations will show that though our gun is light our carriage is heavy, and in the end we lose rather than gain in the total weight.

Our 12-pr. carriage is considerably heavier than is necessary for mere strength; it is in fact so strong that the point of the trail has been placed against a wall while the gun was fired without any damage ensuing to the carriage; in spite of this, the gun "jumps" to such an extent that depression has to be given for the first 350 yards. The accuracy of the shooting is affected to such an extent that it has been proposed to reduce the muzzle velocity to 1600 f.s., and since the work done on the carriage increases as the *square* of the velocity, no doubt this would be sufficient; a still further reduction would have to be made however before the weight of the carriage could be lessened, and this being most undesirable in the interests of shell fire, we must look elsewhere for a means of reducing the total weight behind the teams, at all events for the field artillery.

Our method of checking recoil is to lock the wheels; the gun and carriage forming one system, and the shock being imparted instantaneously to the whole, there is a breaking strain on the trail, and a tendency of the whole system to revolve round the point of the trail, the latter being the difficulty in the way of lightening the carriage, the former, as already pointed out, being more than provided for.

We require then some means of checking the tendency to "jump" before the weight of the carriage can be reduced, and it appears that any method which will convert the *shock* of recoil into a rapidly increasing *pressure*, such, for instance, as that in use in the Russian service, will meet the requirements of the case, and enable us to take off all the weight which is not absolutely required for purposes of

¹ The 12-pr. so-called, carries a shell weighing 12½ lbs.

strength. A description of some of the most feasible methods of accomplishing this end is given in the Appendices B and C. It will be observed that none of the proposed systems entail more weight in the carriage than we have in our present service carriage, viz., 19 cwt. 23 lbs.

Lightening
the carriage.

The most obvious means of securing a considerable reduction in the weight of all our military carriages, is to employ American wheels made of hickory, instead of the clumsy combination of oak and ash which does duty for a wheel in our service; there is an old-fashioned prejudice in favour of English oak, which however is founded entirely on sentiment, and does not stand the test of practical experiment. The United States Ordnance Department made experiments with various materials in order to find their breaking strain, by fixing the end of a one-inch square bar of the material under examination, into a support, and suspending weights from the bar at a distance of one foot from the point of support; the breaking weights for various kinds of timber were thus found to be:—

American	Hickory ...	250 lbs.	|	African Oak ...	208 lbs.
	Live Oak ...	245 "		English {	Ash 168 "
	White Oak...	230 "			Oak 140 "

American hickory is thus seen to have one-and-a-half times the breaking strength of English ash, and more than one-and-a-half times the breaking strength of English oak; the difference in the tensile strength is even greater. The great comparative strength of American woods is due to the dryness of the climate in which they grow.

The weight of the 12-pr. carriage and limber wheel is 2 cwt. 17 lbs., of the wagon and wagon limber wheel 2 cwt. 11 lbs.; in every case the weight of the *woodwork* is the same, namely, 88 lbs.; it is impossible to compare wheels satisfactorily without the aid of actual experiment, but it seems fair to conclude that a saving of at least 20 lbs., could be effected on each wheel without any sacrifice of strength. We should thus have for the weight behind the teams in the gun 1 ton 17 cwt. 61 lbs.— $20 \times 4 = 1$ ton 16 cwt. 93 lbs., and in the wagon 1 ton 17 cwt. 87 lbs.— $20 \times 5 = 1$ ton 16 cwt. 99 lbs. In the present gun carriage of course it would be impossible to lighten the wheels unless an equivalent weight were substituted to check the "jump"; this could be effected by carrying four more case shot on the gun carriage instead of in the limber. A very substantial saving could thus be effected with no expense, beyond that of replacing the present wheels by American ones.

For the horse artillery a still lighter carriage is desirable, and it seems advisable to reduce the charge in the 12-pr. horse artillery gun, so as to bring the muzzle velocity down to 1500 f.s., the result of this would be a difference of 23 foot-tons in the muzzle energy of the projectile; theoretically this would lessen the work done on the carriage to such an extent, that its weight might be reduced from 19 cwt. 23 lbs. to 16 cwt. 8 lbs.; thus we shall be well within the mark practically, both as regards recoil and strength of carriage, if the weight is reduced by $2\frac{1}{2}$ cwt.; we should then have—

			Tons.	cwts.	lbs.
Weight of present gun and carriage	... ..	...	1	17	61
Deduct	{ difference of weight of 4	cwts. lbs.			
	{ hickory wheels	0 80			
	{ difference in weight of				
	{ horse artillery carriage	2 56			
		<hr/>	0	3	24

Weight of proposed horse artillery gun and carriage... 1 14 37

This weight would fully satisfy the requirements of horse artillery, so far as mobility is concerned; the weights given above for field artillery not only increase the mobility of that arm, but bring the weight behind the wagon teams to within a few pounds of that behind the gun teams; an approximation of the greatest importance to shell fire. The effect of the proposed reduction in muzzle velocity upon shell fire will be fully discussed under that head (p. 339).

Extent to which Mobility influences the Fighting Power of Field Artillery. On the line of march.

The extraordinary failure of the Prussian Artillery in 1866, was due in a great measure to lack of mobility on the line of march. It has been popularly supposed that the Prussian Artillery was inferior in *material* to the Austrian, and that this accounts for the small results achieved by it in that campaign; this long cherished delusion has however been definitely set at rest by Prince Kraft in his "Letters on Artillery," in which he states that the proportion of rifled guns to smooth-bores in the Prussian service was as ten to six, and that the Prussian rifled guns were so superior to the Austrian, that ten of the former might be considered equivalent to sixteen of the latter; and further, that the Austrian guns were "complicated in construction, of slow and difficult service, the percussion shell uncertain in its burst, and the shrapnel doubtful in its effects;" and again "we gunners on one side and on the other did not make a sufficient number of hits." It is not then to any superiority in the material or shooting of the Austrian guns that we must look for an explanation, but to the inferior mobility of the Prussian Artillery.

In the Prussian service the Divisional Artillery was kept so far in rear of the marching columns that it was seldom able to prepare the attack for the infantry, and the reserve artillery frequently did not come into action at all until near the close of the fight; the consequence was that the Prussian guns invariably found themselves over-matched, and it was to the infantry with their breech-loading rifle that the Prussian successes in 1866 were due.

Thus, at the passage of the Bistritz, General Fransecky had only eleven battalions engaged in a contest for the possession of the forest of Swip, opposed to forty Austrian battalions, with eleven more in reserve. To support the infantry in what was perhaps the most critical situation of the day, the Prussian Artillery only succeeded in bringing 24 guns into action, while the Austrian artillery concentrated the fire of 128 guns on their enemy at this spot; the destruction

Passage of
the Bistritz
(battle of
Koniggrätz)

caused by this fire was terrible. At no time during the battle of Königgrätz did the number of Prussian guns in action exceed half that of the Austrians.

The failure of the Prussian artillery to afford adequate support to the infantry on this and other occasions in 1866, was severely commented upon after the war, and the bitter lesson laid to heart by those principally concerned; the result was seen in the brilliant achievements of that arm in the campaign of 1870. In 1866, the Prussian batteries, far in rear of the marching columns *advanced at a walk* and took up positions at a gallop; in 1870 the German artillery would sometimes *trot for miles* before coming into action, and often succeeded in nearly silencing the French guns, before their own infantry appeared on the scene. The marvellous concentration of guns at Sedan was a crowning proof of how well the lesson of *mobility on the line of march* had been learnt.

Taking up
positions
from column
of route.

There are few more remarkable instances of subordinate commanders entering upon an important engagement, in opposition to the orders of the Commander-in-Chief, than is furnished by the Battle of Spicheren. Not only had there been no intention of fighting a battle on this day, but a little breathing space was urgently needed, in order to re-adjust the marching columns of the 1st and 2nd Armies, which had become somewhat entangled; in addition to this, the difficult nature of the ground rendered it imperative on the assailants to constantly take up fresh positions in order to use the guns with effect; but in spite of everything, at the first sound of the firing, batteries hurried up from long distances at a steady trot, and moving forwards as they arrived on the field, came into action successively from Reppertsberg to Winterberg, in spite of determined counter-attack on the part of the French, in which a battalion of infantry was temporarily driven back, succeeded in establishing themselves on the Galgenberg, and thence advanced to the Folster heights; the battle was still raging without any decided advantage to the German arms, when with the greatest gallantry and heavy losses, eight guns were got into action on the Rotherberg, a position which the Brunswick Hussars had just tried to seize without success, and "afforded a support to the infantry, of which by this time it was sorely in need."

In absence
encounters.

At the Battle of Nachod in 1866, the Austrians had 96 guns, the Prussians 90; of these, by 11 a.m., there were in action 12 Prussian against 32 Austrian guns; by noon 18 Prussian against 32 Austrian; by 4.30 p.m. 18 Prussian against 80 to 88 Austrian; subsequently the Prussian total was made up to 66 guns. Prince Kraft, commenting upon the ultimate retirement of the Austrians, says—"On this occasion also our brave infantry continued to conquer in spite of a hostile artillery superior to our own." The Austrian version of the affair, however, is that they retired in accordance with superior orders, their artillery keeping the enemy in check in spite of the advantage conferred on him by the possession of a breech-loading rifle.

Taking up
positions
under fire.

The following incident from the Battle of Königgrätz related by Prince Kraft is illustrative of the importance of rapid movement under fire—"I therefore chose a position half way between Maslowed

and Nedelist, on the ridge which runs from one to the other. I ordered the Adjutant to bring the batteries there while I went directly to the spot to select their positions. During this interval the enemy's artillery had increased so much that the crest of the height which runs from Chlum to Nedelist appeared as if crowned with a continuous row of guns The enemy fired a shot which fell 100 yards short, a second fell as far over me, while a third struck the ground close to me ;” the Austrians had found the range and were waiting for the batteries to come into position! Prince Kraft, however, ordered the batteries, the moment they crowned the ridge, to follow him at a gallop to another spot 300 paces nearer to the enemy: he continues—“Hardly had the leaders appeared when the horizon was covered with blue clouds, and a rapid fire was kept up by more than a hundred guns ; but at this moment, I spurred my horse and galloped 300 paces nearer to the enemy ; the batteries followed ; the enemy's projectiles all passed whistling over our heads and *fell in rear of us on the road.*”

It is not sufficient to possess mobility, it is necessary to be able to utilise it to the greatest advantage under all circumstances ; in the withdrawal of guns from action in order to employ them more usefully in another part of the field, we are met with somewhat exceptional difficulties. I. The reluctance of battery commanders to go temporarily out of action. II. The supposed difficulty of flank marches under fire. III. The notion that the withdrawal of guns would exercise a bad moral effect on the infantry. These difficulties however are more imaginary than real ; it is just as necessary for battery commanders to bring their guns out of action when ordered, as it is for them to remain in action until ordered to withdraw, and officers of all ranks must obey orders, even in the excitement of an engagement, if military operations are to be attended with success.

Withdrawal
of guns in
action.

The difficulty of flank marches is much over-rated. “As a rule it is not difficult to withdraw artillery in action from the fighting line, and employ them in another part of the field ; flank and diagonal marches, which artillery do not make readily under fire, can always be made in case of necessity.”¹ Of course “the quicker such changes are executed, the shorter is the time that the guns are useless,”² and the less chance of their being injured by the enemy.

With regard to the moral effect on the infantry, which has been made rather a strong point of by some writers, nothing could have been much worse than the manner in which the Prussian batteries went out of action in 1866, to re-fit or replenish their supplies of ammunition ; but even this did not in any one instance produce a bad moral effect on the infantry ; if there is any danger of demoralization among the the infantry, it is much more likely to be caused by seeing the artillery in action unable to cope with the enemy, and finding that the principal duty which devolves upon it, is, *to save the guns from capture.*

The consequence of neglecting these principles was seen at

¹ Hoffbauer.

² Wolseley.

Gravelotte, when the German batteries opened fire from the spur (1058)¹ against the *prepared* and *concealed* positions of the French; the German guns, though unable to establish any superiority over the French artillery or to hold the enemy's infantry in check, remained in action until ammunition ran short; their losses are significant of the necessity for rapidly withdrawing from action and taking up fresh positions, when the enemy has succeeded in establishing the superiority of his shell fire; unless there is some very special reason for remaining under fire.²

Attack of
Infantry in
the open.

In attacking infantry in the open, mobility is essential to enable the guns to come rapidly into action at the most effective ranges, and to maintain the fight at those ranges which shall be most disadvantageous to the enemy. "A line of artillery which resolutely advances at a rapid pace straight at the enemy, and to within close ranges, seeking a decisive engagement, is not easy to hit, and must have great ill-luck if it does not succeed in unlimbering and firing."³

Attack of
fortified
positions.

"The Artillery of the Attack," says von Schell "can never be too strong; it is of the greatest importance to oppose to the enemy the largest number of guns possible in excess of those which he is able to bring into action himself, and thus to make certain of establishing one's superiority at the very outset." On the 6th August, 1870, the Germans brought a line of 108 guns into action opposite Woerth by 9.30 a.m., before the infantry had deployed, and this, though no fighting had been expected on that day. During the preparatory phase of the attack, fresh batteries hurried up to reinforce the skirmishers, and to support the frontal attack against the Niederwald. Shortly after 1 p.m., there were 200 guns in action against the French position. Not content with this, batteries were pushed across the river, and 48 guns came into action to support the attack on Elsasshausen; shortly afterwards, these guns were the only means by which the counter attacks of the French could be repulsed. Between 3 and 4 p.m., 13 batteries had crossed the Sauerbach, and were preparing the final attack against Froeschwiller, at which point single batteries frequently advanced in front of the line of skirmishers, and thus, by checking the furious counter-attacks of the French, gave time for the infantry to re-form, and renew the assault in an organized manner. The Germans lost 8000 killed and wounded, the French only 6000; the comparative smallness of the French losses says much for the

¹ Map of German official account.

² The German batteries were in echelon, left in front; the losses were as follows:—

		Officers.	Men.	Horses.	Guns.
2nd Heavy Battery	...	1	23	70	4
4th " "	...	3	45	49	—
3rd " "	...	3	32	54	—
4th Light " "	...	2	27	48	—
3rd " "	...	2	24	47	—
2nd Horse Artillery	...	2	36	102	—
Total 6 batteries	...	13	187	370	4

In addition to this five ammunition and store wagons were abandoned, and the 85th Regiment lost nearly half a battalion in trying to save the guns from capture.

³ "On the Employment of Field Artillery, &c."—Prince Kraft.

strength of their position, and the Germans justly attribute their success on this day to the thrusting action of their artillery.

When the German advanced guard reached Trouville on the morning of the 16th August, the skirmishers of the French 3rd corps were observed between that place and Vionville; the second horse artillery battery immediately opened fire, the French cavalry retired and unmasked some guns 1200 yards away west of Vionville; more horse artillery guns were rapidly brought up, and the French skirmishers compelled to retire; the retreat being converted into a rout by the dashing advance of the batteries of the left wing. "Shortly after this, however, the French infantry having recovered from its confusion, advanced in superior numbers, and compelled the German cavalry to fall back. The horse artillery batteries in action *were however being constantly re-inforced*, and between 11 and 12 there was a line of 126 guns in action between Vionville and Trouville."¹ The Germans were thus from the very commencement of the engagement able to deny the Verdun road to the French, and this entirely owing to the brilliant action of their cavalry and artillery.

Reinforce-
ment of
Artillery in
action.

The mobility of the German artillery again asserted its influence on the fortunes of the day, when Stulpnagel's division with its artillery ammunition nearly exhausted was on the point of being pressed back; fortunately, however, "the troops ordered up from the 10th corps had meanwhile reached their destination, the batteries, *owing to their great mobility*, being the first to arrive."² The whole of the artillery of the 10th corps was in action before any of the infantry of the main body was engaged!

At first sight the necessity for mobility on the defensive does not seem so apparent as it is on the offensive; it is however equally real though more restricted in its scope. If the French batteries had been reinforced at Spicheren at the same rate as the Germans were at Mars-la-Tour, the former engagement would probably have ended differently. Again, compare the use made by the Austrians of their artillery in 1866, especially at Königgrätz with the insignificant rôle enacted by the French artillery in 1870, notably at Mars-la-Tour.

On the de-
fensive.

After the capture of Rosberitz (battle of Königgrätz) by the Prussian Guard, "the Austrians prepared the counter-attack by bringing into action the converging fire of 120 guns, three times as many as we (the Prussians) could oppose to them . . . the Prussian Guard was compelled to abandon Rosberitz."³ How different was the case for the defensive at Mars-la Tour? After von Bredow's cavalry charge, was an ideal moment to assume the offensive, but "Forton's cavalry did not attempt any pursuit," and the French artillery, though more numerous than the German, was permitted to remain inactive, instead of preparing for a bold counter-attack, which might have decided the fortunes of the day.

Counter-
attack.

Though strictly the rôle of the horse artillery, it is indispensable

Pursuit and
retreat.

¹ Hoffbauer.

² Hoffbauer.

³ Prince Kraft "Letters on Artillery."

that the field artillery should be able to assist the more mobile branch under this head, especially in covering retreats. The splendid behaviour of the Austrian artillery after the battle of Königgrätz in covering the retreat of the army, offers an example which artillery officers and others may study in detail with advantage. Moving rapidly from one position to another, and quickly concentrating in superior numbers at every advantageous point, the Austrian artillery fought out the fight inch by inch with indomitable pluck, and saved the remainder of the Austrian troops from annihilation.

Compare the action of the French artillery at Woerth, on which occasion 6000 unwounded prisoners were taken during the pursuit by the Germans.

Our single horse artillery battery at Maiwand behaved with the greatest gallantry in endeavouring to cover the retreat of our troops, but being unsupported except by the fire of one smooth-bore battery of inferior mobility, was unable to cope with the immense numerical superiority of the Afghan artillery; the latter, however, did not possess sufficient mobility to enable it to follow up the advantage it had already obtained, and was unable to harass our retreat to any appreciable extent.

In the case where artillery is attacked or surprised when limbered up, mobility is its only safeguard.

Shell Fire.

"The real influence of artillery in an action is due entirely to the effects of its fire."—*von Schell.*

The effects of shell fire are due to—

Constitution
of shell fire.

- I. Accuracy of shooting.
- II. Destructive power of shell employed.
- III. Rapidity of fire.
- IV. Number of guns in action.
- V. Skill in fire-tactics.

The first consideration is *accuracy*, without which all else is of little value; the causes which contribute to accuracy are:—

- a.* Excellence of the weapon.
- b.* System of sighting.
- c.* Knowledge of the range.
- d.* Care in laying and observing the effect of each round.
- e.* Practice in peace time under service conditions.

Accuracy.

"Our 12-pr. B.L. gun is undoubtedly the best field gun in existence, and it is to be hoped that no false economy may prevent us from arming our field artillery with it.¹ It is satisfactory to know from Mr. Stanhope's recent statement in the discussion on the army estimates, that the whole of the artillery for two Army Corps will be armed with this gun before the close of the current financial year.

¹ Wolseley.

Scott's revolving telescopic sight leaves nothing to be desired; this new system renders it almost impossible to miss the mark after a couple of trial shots; it is, moreover, a valuable accessory to the range-finder, and from the ease with which all ordinary sources of inaccuracy can be overcome, renders rapid firing far more easy and effective than it could be under the old system; laying correctly is a certainty, and the observation of the effects of our fire is reduced to a practical science, easy to understand and carry out. Scott's sight gives our artillery a potentiality for destruction, which is probably not fully realized even yet, and the results on active service should be of a far reaching nature, one of the most important being the economy of ammunition effected by seldom firing without producing a substantial effect.

Practice in peace time, under service conditions, is carried out far more thoroughly under this head than under that of "Mobility," there is of course room for improvement, but considering the limited number of rounds allowed per man for annual practice it is difficult to see how much greater efficiency can be expected; unless indeed we train half our gunners as "*pointers*," and thus manage to give them twice the number of rounds for practice. This system is adopted to a great extent on the Continent and offers many advantages.

The practice of issuing old or damaged ammunition cannot be too strongly deprecated, and is false economy of the most dangerous kind.

The destructive power of a shell depends upon the—

- a. Nature of shell employed.
- b. Action of the fuze.
- c. Weight of metal.

Destructive
power of
shell.

In the Franco-German war, the Germans obtained good results with common shell and percussion fuze. "On the day after the battle of Mars-la-Tour, an extraordinary number of French corpses and a large herd of cattle lay in and about Flavigny, torn and mangled with shells."¹

At the Battle of Gravelotte, a strong body of French infantry south of Amanvillers was repulsed by the fire of 30 guns under Prince Kraft, who thus relates what took place:—"My guns set to work to find the range by firing trial shots at different points We had not long to wait for the first movement which the enemy's infantry was to make in our direction. It advanced from Amanvillers in quarter column and attacked us energetically; when the head of the column became visible over the hill, our trial shots reached it at a range of 1900 paces, and my 30 guns opened fire; the enemy's infantry was enveloped in a thick smoke which the shells made as they burst; but after a very short time we saw the red trowsers of the infantry which were approaching us appear through the cloud. I stopped the fire; a trial shot was fired at 1700 paces to show us the point up to which we should let them advance before re-opening fire. We did the same for the ranges of 1500, 1300, 1100 and 900 paces. In spite of the

¹ Hoffbauer.

horrible devastation caused in their ranks, these brave troops continued to advance, but at 900 paces the effect of our fire was too deadly for them—they turned short round and fled. Altogether three attacks were made, but the two last were stopped at 1500 paces.” The losses inflicted by the French artillery on the German batteries in action on the spur (1058)¹ at the Battle of Gravelotte, are eloquent of the power of well directed shell fire.²

The results of the shell fire in this campaign compare most favourably with those obtained in 1866, and we may reasonably expect a still greater advance in the next great campaign from the use of shrapnel and an improved time fuze. Our old wood time fuze has fortunately been superseded. At the Battle of Ingezano “the artillery fired 65 rounds of shell; at the commencement of the action the practice with the shrapnel was excellent, but the want of a more perfect time fuze was sorely felt. Some splendid chances were lost, through loss of time in boring and fixing . . . it is impossible to suppose that in the heat of action a time fuze can be bored with any degree of accuracy . . . undoubtedly one’s first impulse is to discard the time fuze, and use the percussion fuze altogether.”³

Our new metal time fuze promises good results up to a range of 3300 yards, but this is not enough; it is at the long ranges that the time fuze most conspicuously asserts its superiority over the percussion fuze.

In the Franco-German War it was remarked that “the damage done to matériel, even in the batteries which suffered most from the enemy’s artillery fire, was extremely slight. Hence the opinion is justified that less attention should be paid to disabling guns, than to disabling men and horses.”⁴ It may be considered pretty well established that shrapnel shell especially with a good time fuze is far more effective against troops than common shell; even with percussion fuze the shrapnel more than holds its own. “It would appear to be one of the most usual mistakes made in regard to common shell, to suppose that they are effective when the practice is indifferent, the real fact is that with the very best practice, their effect is not to be compared with that of shrapnel shell; with fair practice it is very small, and with indifferent practice there is absolutely no effect.”⁵

The above considerations have led us to adopt a far larger proportion of shrapnel than obtain with most continental nations; it should however be remembered that the common shell of most foreign powers is more in the nature of a ring or segment shell, and has therefore higher man-killing power than our own common shell, though at the same time there is a corresponding decrease in its effect against material. Though we may regard shrapnel therefore as the staple projectile of the horse and field artillery, we must remember that, on

¹ Map of German official account.

² See foot note, p. 334.

³ Lieut. Lloyd, R.H.A., Vol. XI., R.A.I.

⁴ Hoffbauer.

⁵ Major J. S. Nicholson, Vol. XI., R.A.I.

occasion, common shell are most necessary; our 12-pr. common shell, with its bursting charge of $1\frac{1}{2}$ lbs. is a projectile of immensely superior power to the 9-pr. common shell, the latter being of practically little use against earth or material. "In the prolonged bombardment of Urzoo, the insignificant effect of the 9-pr. common shell was particularly noticed, and again in the case of Giniss the results were trifling."¹ We may however hope for even better results than our 12-pr. common shell is at present capable of by the introduction of a superior explosive. The French have obtained good results with "*melinite*" shells in their siege guns, and have ordered 200,000 to be made. The invention of "*Emmensite*" in America promises to combine higher explosive power with greater safety; the new explosive being readily melted and cast into any desired shape or granulated. The Turkish experiments at the Dardanelles, with Suyder's nitro-gelatine shells in field guns have also been most successful; the method of loading is a secret, Suyder's patent avoids the shock to the shell which appears inseparable from the ordinary mode of loading and firing.

In order to obtain the best possible results from our field artillery shell fire, it is necessary to use the heaviest shell consistent with mobility, and it is at this point that we find the interests of shell fire and mobility in an attitude of irreconcilable antagonism. As already stated, we may consider the weight behind the teams as practically a fixed quantity; we may also regard the total weight of ammunition which it is practicable to supply in the field, as a fixed quantity; the weight of the shell becomes then a question of proper proportion; any increase involves an increase in the powder charge, an increase in the weight of the gun and carriage, and a decrease in the number of rounds that can be carried. We have been compelled to reduce the number of rounds carried with the 12-pr. to 108, which certainly appears to be the minimum consistent with efficiency. Failure of ammunition is the evil most to be dreaded by a gunner. In the battle of Mars-la-Tour, Stulpnagel's Division was hard pressed, owing to the failure of ammunition in the German batteries, "the slowness of their fire and the silence of some of them, encouraged the enemy to make more frequent and vigorous attacks against the decisive point."² From what has already been said (pp. 329, 330 and 331), it appears that our 12-pr. can be made to satisfy all the necessary conditions of mobility both for horse and field artillery; the proposed reduction of the muzzle velocity is not such a serious matter as might appear at first sight, since after a muzzle velocity of 1600 f.s. has been reached, the resistance of the air increases in such a rapid ratio, that, with a light shell, an additional 120 f.s. muzzle velocity makes but little difference in the effective power of the shell at moderately long ranges, while it adds enormously to the strain on the gun and carriage.

The following comparative table for the 12-pr. B.L. gun illustrates this clearly:—

¹ Callwell's Prize Essay, R.U.S.I., 1886.

² Hoffbauer.

Muzzle velocity.	Work done on carriage.	Remaining velocity at 2000 yards.	Remaining velocity at 3000 yards.	Striking energy at 3000 yards.	
f.s. 1720	foot-tons. 297	f.s. 993	f.s. 856	foot-tons. 62.6	
1600	256	963	833	60.1	
120	41	30	23	2.5	Differences.

So that for a difference of 41 foot-tons of work done on the gun and carriage, we only obtain an increase of 2.5 foot-tons in the striking energy of a common shell at a range of 3000 yards! This may be considered conclusive justification of the proposed reduction in the muzzle velocity.

Arguments
for a heavier
shell.

Many arguments have been adduced in favour of a heavy field gun throwing a 20-pr. shell; the strong prejudice in favour of heavy field artillery had its origin in the Crimea, from the circumstance that Sir C. Dickson obtained decisive results at the Battle of Inkerman by the use of two 18-prs.; so much as this is generally known, but tradition has forgotten to state that these guns were close at hand in standing camp, and were not called upon in any sense to fulfil the requirements of mobility, which are inseparable from the employment of modern field artillery. Now that the introduction into our service of a 20-pr. is pending, it seems a good opportunity to discuss the advantages which would accrue by employing it on the one hand, as a heavy field gun or on the other hand, as a light siege gun. The advocates of a 20-pr. *field* gun put the question tersely enough—"Why cannot the field artillery now, drag as heavy a weight as the horse artillery did prior to 1860?" The answer is, that since 1866, a new era has dawned upon artillery tactics, and guns are no longer considered as part of the train, but are brought into action as early as possible in the day; moreover the Commander who succeeds in utilizing to the utmost, the largest proportion of his guns, is the one who contributes most to the success of the operations. Such heavy field guns as the 20-pr. are in the nature of "*reserve artillery*," a force which no longer has any part to play in war. The rôle of the field artillery is the destruction of men and horses; if earthwork or material has to be encountered, and is impervious to the 12-pr., the case is sufficiently serious for the employment of the light siege train; the hasty defences to be met with in the field are however not of a nature to withstand the 12-pr., and if resistance is to be encountered in the shape of elaborate field works as at Plevna, the 20-pr. will do its work none the less efficiently for being called a light siege gun—the gain of a few hours is an unimportant matter in such a case. If such resistance is expected, there is not the slightest difficulty in giving the 20-prs. a forward position on the line of march; temporary measures of this nature can always be resorted to when necessary, as in the attack on Ali-Musjid, and the advance to Kandahar; but this is a very different thing from allowing 20-pr. batteries to form

part of the establishment of an Army Corps, and thus reducing the proportion of the more mobile 12-pr. batteries. In carrying out any of the ordinary field operations for which a Division or Army Corps is constituted "any guns that cannot be brought into action are an encumbrance, they block up the roads and hamper every movement."¹ We gunners should find we were much more highly appreciated by the other arms of the service, if we did not insist upon dragging about such impossible guns² with us, our company on the line of march would be as much sought after as it is avoided now, and Generals would endeavour to take as large a force of artillery with them upon every expedition as its nature would allow, instead of remorselessly cutting down that arm to the lowest point possible.

Rapidity of fire is regulated in the first instance by the rate at which it is possible to perform the various operations of loading, laying, &c., and ultimately by the supply of ammunition. The value of rapid fire may be gathered from Bazaine's description of the effect produced by the batteries of the German advanced guard at Mars-la-Tour:—"Along the whole of the enemy's front, numerous heavy (*sic*) batteries, to which our artillery found great difficulty in replying, covered us with shell . . . the hostile cannonade continued to become more intense, we were harassed by guns of very heavy calibre." As a matter of fact, the German batteries here alluded to, were principally those of the horse artillery!

In order to maintain a rapid fire, the supply of ammunition must be close at hand; small field magazines, capable of holding one ammunition box and protecting it from the enemy's shell fire, can be excavated in a few minutes close to each gun, and the men of the detachment thus saved from the arduous and perilous duty of running backwards and forwards under fire between the gun and limber: the necessity for some provision of this nature was clearly proved at Maiwand, and in the first action of the horse artillery in the advance to Kassassin. It is moreover essential that wagons should never be separated from their guns until the latter go into action; the proposed employment of American wheels would save nearly a hundredweight on the wagon, and almost equalise the weights behind the teams in the gun and wagon (see p. 330), thus bringing the difficulty to a minimum from a technical point of view. This however is not all; it is most necessary that artillery officers should appreciate the value of having their sub-divisions intact, and not allow officers or men of the other arms to imagine that the wagons are regarded as an encumbrance; cordial co-operation from the other branches of the service in keeping wagons and guns together cannot be expected unless gunners themselves insist upon its necessity. At Mars-la-Tour, the critical state of Stulpnagel's Division, owing to the failure of artillery ammunition and the consequent *slowness of fire*, has already been alluded to (p. 335) and this was by no means the only case in the war of 1870; "the

¹ Wolseley.

² The English 20-pr. and 16-pr. guns have the greatest weight behind the teams of any field guns in Europe.

ammunition columns as a rule were not close enough."¹ A quick firing gun with fixed ammunition has been advocated for horse artillery, there are however three strong objections to its introduction :—

- I. Such a gun must be non-recoiling, and as such could not throw such a heavy shell as the 12-pr., nor could it attain the same muzzle velocity.
- II. The ammunition for horse and field batteries would no longer be interchangeable.
- III. There does not appear to be any particular necessity for such a gun, inasmuch as there is scarcely a case on record where it has been found impossible to *serve* the gun with sufficient rapidity; the expenditure of ammunition being limited by the possible supply.

Number of
guns in
action.

Any increase in the mobility of our batteries up to a certain point, will give a corresponding increase in the number of guns that we can *bring* into action, and an increase in the mobility of our wagons, will enable us to *maintain* a correspondingly greater number in action. In our service we seem to suffer from a chronic complaint—too many guns on the line of march and too few in action. In the Egyptian campaign "the little force at Kassassin had amply fulfilled the trust reposed in it, the only *serious* inconvenience to which it had been exposed, had been a deficiency in the artillery arm."² "In the rapid previous movements it had been impossible to drag the artillery wagons through the sand, the additional horses were required to assist the guns themselves over the ground . . . the guns were absolutely without ammunition, and it was thought better to go back to Mahsama."³ The disaster of Maiwand was entirely due to an insufficient number of guns in action, the enormous numerical superiority of the Afghan artillery, rendering it impossible for our small force to draw away the bulk of the enemy's shell fire from the cavalry and infantry.

Fire tactics.

In our service the system of fire tactics is somewhat haphazard, and there is urgent need for an authoritative ruling upon the many points of difference which may arise under this head. When batteries are working together in groups, the group should be the *fire-unit*, and the "concentration," of which we hear so much, should be the *concentration of command*. The repulse of the French infantry by Prince Kraft's 30 guns (see p. 337), south of Amanvillers, was entirely due to the harmonious working of the group under the control of one commander; the maximum effect was thus obtained from the group *as a whole*, and there was no frittering away of strength *in detail*. It is to be hoped that this subject may meet with the attention it deserves, in order to ensure the best use being made of our shell fire under all circumstances, and that a well considered work on "*Fire Tactics for the Field Artillery*" may shortly be in the hands of every officer.

¹ Hoffbauer.

² Egyptian official.

³ *Ibid.*

Summary.

It will readily be granted that shell fire in the field artillery is absolutely dependent for its success in the first instance, on mobility ; and while it should be an axiom to employ the heaviest artillery possible consistent with mobility, we must never lose sight of the fact that when the limit of mobility has been reached, any attempt to exceed it can only result in a loss of shell fire. The value of mobility has been illustrated by numerous references to the campaigns of 1866 and 1870-71, and while these serve to bring clearly before our mind, the conditions of continental warfare under which we may ourselves be required to serve, we must remember that in the smaller campaigns to which we are more accustomed, the necessity for a high degree of mobility is even accentuated, and the instances taken from the Afghan, South African and Egyptian campaigns will serve to emphasize this statement.

The struggles of our artillery through the Bolan Pass ; the decision of Sir F. Roberts to march to the relief of Kandahar without any wheeled artillery, in spite of the risk of fighting a great battle without the assistance of that arm ; the difficulty of bringing the guns through the heavy sand in Egypt, and the risks attendant on the advance to Kassassin ; the disasters of Isandlwana and Maiwand ; all these serve to remind us, that, though the normal rôle of our field artillery is not to take part in such marches and battles as are recorded in 1870, we have still to face the even more severe strain of marching and fighting in countries without roads, crossing rivers without bridges, traversing mountain ranges and sandy plains, with our base hundreds of miles distant, perhaps inaccessible, and no possibility of replacing casualties in our gun teams from the resources of the country in which we are operating.

Guns which cannot be brought into action are an unjustifiable encumbrance, and yet, in spite of the ample evidence to this effect, we do not seem to be any nearer possessing a really mobile force of field artillery than we were twenty years ago, in fact the tendency seems all the other way. Moreover it seems probable that should we be engaged in a European war before 1890, our field artillery would consist of 9-prs., 12-prs., 13-prs., 16-prs. and 20-prs. ; truly a motley array, and one that would severely tax the ingenuity of our Administrative Staff to keep supplied with ammunition in the field.

The following points appear to call for special attention :—

Deductions.

1. Maintenance of the batteries of the 1st Army Corps on a war footing, and an increase in the establishment of men and horses in the 2nd Army Corps (pp. 326 and 327).¹
2. Organization of ammunition columns under the control of the Ordnance Store Department (p. 327).
3. Arming the batteries of the 1st and 2nd Army Corps with the 12-pr. B.L. gun, without further delay : forming the 14 batteries of

¹ Sir Charles Dilke in the *Fortnightly* (Dec. 1887) says—"If it can be shown that the safety of the country is involved, this may ultimately be done."

the "lower establishment" into mountain batteries, light siege trains, and depôts; and handing over the existing store of 9-prs., 13-prs., and 16-prs. to the Auxiliary Artillery.

4. Reduction of weight behind the teams in gun and wagon (p. 331 and Appendix A), and consideration of a better system of checking recoil (p. 329 and Appendices B and C).

5. Introduction of a long range time fuze (p. 338).

6. Selection and training of men as "pointers" (p. 337).

7. Comprehensive system of instruction in marching and fire-tactics (pp. 324 and 342).

8. Simplification in drill and "marching past" formation, and assimilation of peace exercises to the requirements of war (p. 324).

The first three points, involving as they do changes of organisation and expenditure of money, must of necessity become Treasury questions; and it behoves us as "gunners," after satisfying ourselves of their necessity, to place the facts fairly before the country upon every available opportunity, and by earnest and unremitting pressure upon Parliament, do all that in us lies to obtain for our field artillery an organization and equipment which will enable us to face our foes whenever and wherever we may meet them, with the certainty of doing justice to ourselves, and the prospect of earning laurels for our country.

APPENDIX A.

Nature of Gun.	Weight behind teams.	Weight of common shell.	Muzzle velocity	Weight of gun.	Muzzle energy per ton of metal in gun.	Actual Muzzle Energy in foot-tons.
English 20-pr.	tons cwt. lbs. 2 4 0	lbs. 20	f.s. 1600	cwt. 12	foot-tons. 628	377 *
" 16-pr.	2 2 0	16	1355	12	345	207
Russian Heavy	2 1 34	20·23	1450	12·25	482	295
French 90mm	1 19 32	17·6	1403	10·41	536	278
German Heavy	1 18 12	15·4	1457	8·84	510	225
Italian Heavy	1 18 12	14·89	1489	9·66	476	230
English 13-pr.	1 17 84	13·25	1560	8	541	218
Austrian Heavy	1 17 79	13·99	1471	9·56	439	210
English 12-pr.	1 17 61	12·5	1710	7	726	254
	1 16 93	"	1600	"	623	218 †
	1 14 37	"	1500	"	557	195 †
Russian Light	1 16 64	15·26	1450	9·03	402	222
German Light	1 15 48	11·15	1525	7·66	469	179
English 9-pr.	1 15 0	9	1398	6	408	136
French 80mm	1 11 26	12·32	1608	8·45	525	221
Austrian Light	1 10 55	9·51	1386	5·87	439	128
Italian Light	1 5 6	9·35	1381	5·85	422	123

* Not yet in the service, 3. 3. 88.

† American wheels; four rounds case carried on gun carriage instead of in limber boxes; reduced powder charge.

APPENDIX B.

DESCRIPTION OF THE NORDENFELT RECOIL-CHECKING CARRIAGE FOR
12-PR. B.L. GUN.

The principle upon which this carriage is constructed, causes the shock of recoil to act immediately upon the gun, the energy of recoil being gradually and only partially communicated to the carriage, with the result that there is no tendency to jump, and the actual recoil is reduced to one-half of what it would be in the ordinary service carriage; the muzzle velocity could even be increased above 1730 f.s. without undue strain. With the present service charge and maximum muzzle velocity (1730 f.s.), the strain on the trunnions would be from six to seven tons. The gun recoils seven inches more than the carriage, and

is mounted on a sliding crosshead *A* rigidly connected with the ends of the cylinders of two hydraulic buffers (Fig. 3); the piston rods being fixed to the front of the carriage (Fig. 2); each buffer contains a strong spring, which is compressed during the recoil of the gun, and which forces the crosshead back into the firing position before the recoil of the carriage is completed. The path of the crosshead is determined by two guides *BB* (Figs. 2 and 4) fixed to the sides of the brackets, and connected by a cross piece in front into which the heads of the piston rods are fixed. The whole of the elevating gear is attached to the crosshead *A* by an arm and guide *C*, moving on a bearing *D*.

The weight of the carriage with American wheels is the same as that of the present service carriage, the weight behind the teams when limbered up being 40 lbs. less than with the service limber, owing to a saving of 20 lbs. on each wheel.

APPENDIX C.

MAXIM RECOIL-CHECKING SYSTEM.

In this system an entirely fresh departure has been taken; the principle upon which it is founded depends upon the utilisation of a portion of the immense dynamic energy of the gases which rush out of the muzzle of the gun, immediately they are set free by the projectile leaving the bore.

The disc *M* has a hole in the centre, slightly larger in diameter than the calibre of the gun: the moment the gases are released by the expulsion of the shell, they expand in the form of a cone and impinge with tremendous force upon the disc, a portion of course following the passage of the shell through the hole in the centre of the disc. The result is that before the carriage or mounting has had time to experience the full shock of discharge there is already a counteracting strain set up in the opposite direction. Fig. 7 shows the simple principle, and Fig. 10 a modification, by means of which a portion of the recoil is checked as follows:—the barrel *B* recoils in the casing or chemise *A* which is supported by trunnions in the ordinary way: this action causes rod *R* to slide back in the hydraulic cistern *L*, pressing before it the piston head *L*¹, the piston rod *L*² has a flat base *A*⁴ to which one end of a spiral spring *B*³ is attached, the other end being fixed to the base of the cistern; the spring is elongated by the action above described, and subsequently during the natural process of contraction forces the piston forward into its former position, in contact with the end of the rod *R*, in its firing position at *L*⁶. The system as here described is applied to the Maxim Automatic quick-firing guns of large calibre, and the drawings are copies of those lodged in the Patent Office.

The principle of the perforated disc screwed to the muzzle (Figs. 7, 8, and 9) is of course equally applicable to any kind of gun; the hydraulic buffer arrangement shown in Fig. 10 is a special adaptation for the Maxim Automatic system.

It is to be hoped that the "perforated disc" recoil-checking system, may receive an exhaustive trial; it is simple, inexpensive, and promises a substantial reduction in the weight of our carriages; it is useless to theorise upon the actual number of foot-tons which could thus be diverted from acting on the carriage, practical trial would be the only means of arriving at satisfactory results; if the system will save us a couple of hundredweight (and there is little doubt that it would save more than this) on the weight of our 12-pr. B.L. gun carriage, and four hundredweight on the 20-pr. B.L. gun carriage, we shall at length have arrived at a satisfactory solution of one of the most difficult problems in modern gunnery.

Extract from H. S. Maxim's Final Specification No. 4778—87.

"One object of my present invention is to utilize the dynamic force of the smoke or gases which escape from the muzzle of a gun when fired, for counteracting or diminishing the recoil of the gun."

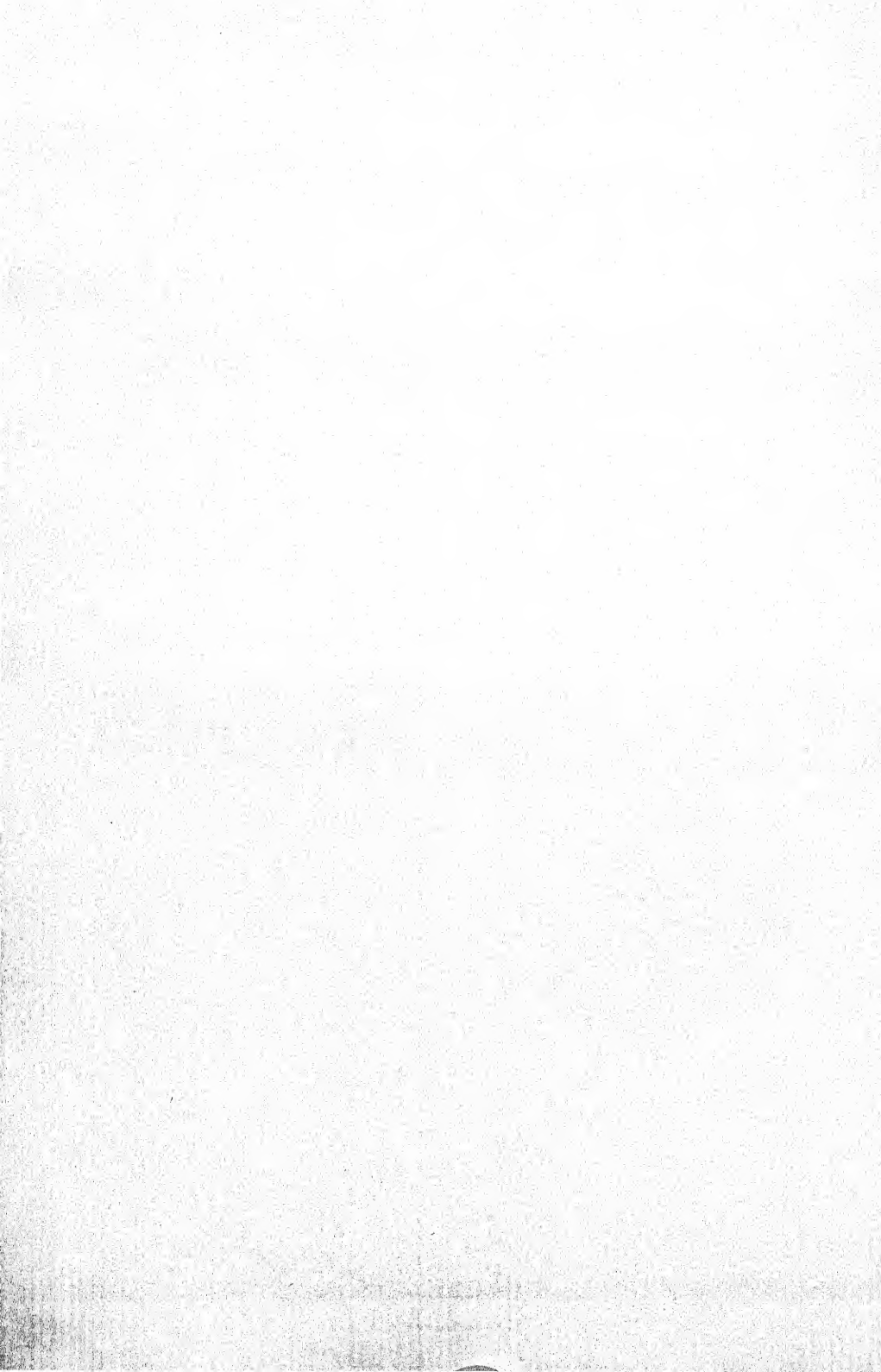
"For the purpose I employ a plate or disc of steel, or other metal, which is attached to the gun in such a manner that it occupies a position in front of the muzzle thereof and which has a hole formed in it, so that, when the gun is fired, the projectile will pass through the said hole, whilst the smoke or gases escaping from the muzzle of the gun will impinge against the said plate or disc. The force exerted by the said smoke or gases upon the plate or disc will pull or tend to pull the gun forward before the recoil thereof takes effect upon the mounting or carriage. Therefore the recoil will to a great extent be counteracted and the shock or concussion produced thereby proportionately diminished."

"*M* is the plate or disc for counteracting the recoil by the dynamic force of the smoke or gases which escape from the muzzle of the gun. This plate or disc may be flat, concave, convex, or of other suitable shape, it may, moreover, be set either at a right angle or at any other suitable angle to the axis of the barrel.

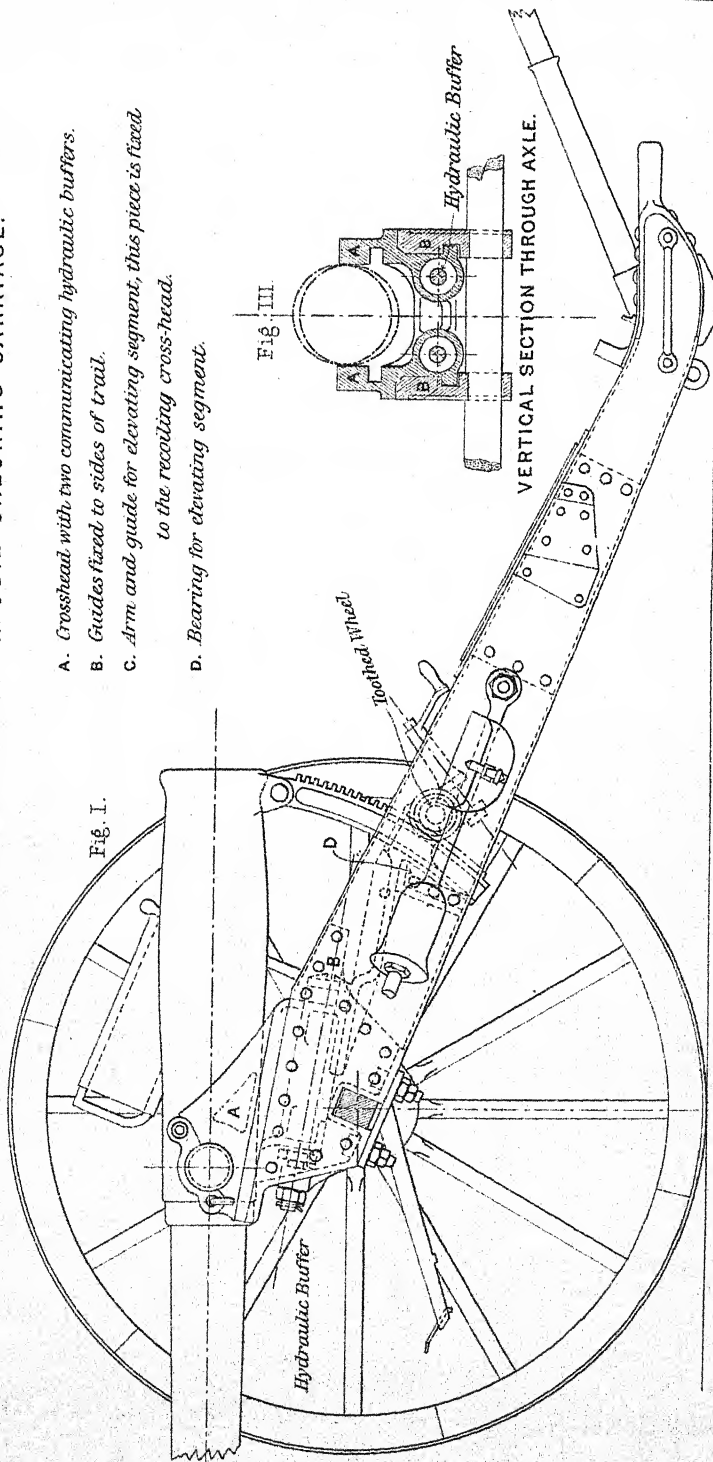
"In Fig. 10 the said plate or disc is shown attached to the gun by means of rods *N* firmly secured in a ring or annular piece *N*¹, which is screwed tightly upon the muzzle of the gun. The said plate or disc is formed with a hole *M*¹ for the passage of the projectiles through it."

"The operation of my improved gun when constructed as hereinbefore described is as follows, that is to say:—The parts are shown in the positions which they occupy when the gun has been fired and is about to recoil in the frame *A*."

"The force and velocity of the recoil are regulated or controlled by the spring *B*³ and by the piston *L*¹ working in the hydraulic cylinder *L* and also by the smoke and gases which escape from the muzzle and impinge upon the plate or disc *M*."

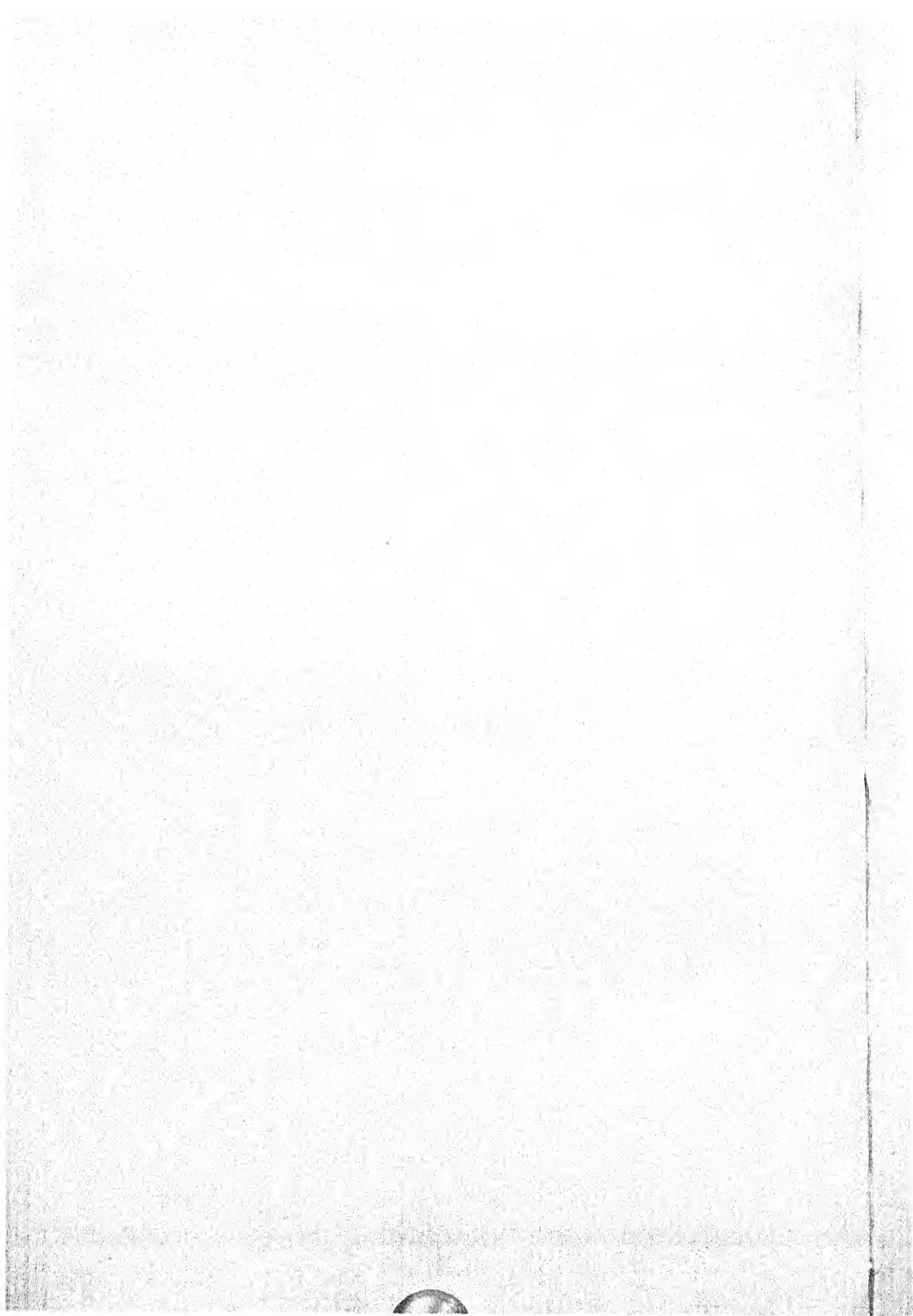


12 PR. B. L. GUN, MOUNTED ON NORDENFELT RECOIL-CHECKING CARRIAGE.



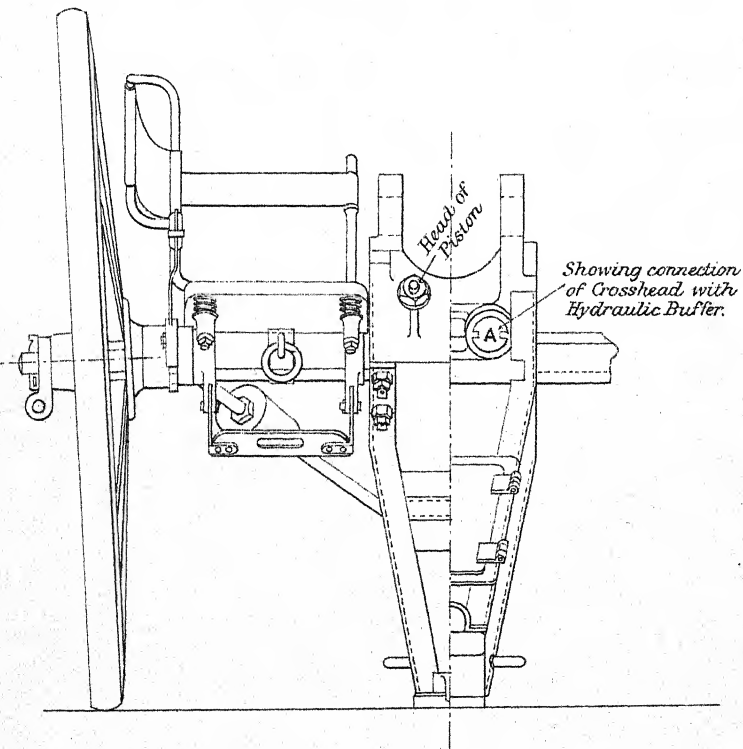
- A. Crosshead with two communicating hydraulic buffers.
- B. Guides fixed to sides of trail.
- C. Arm and guide for elevating segment, this piece is fixed to the recoiling cross-head.
- D. Bearing for elevating segment.

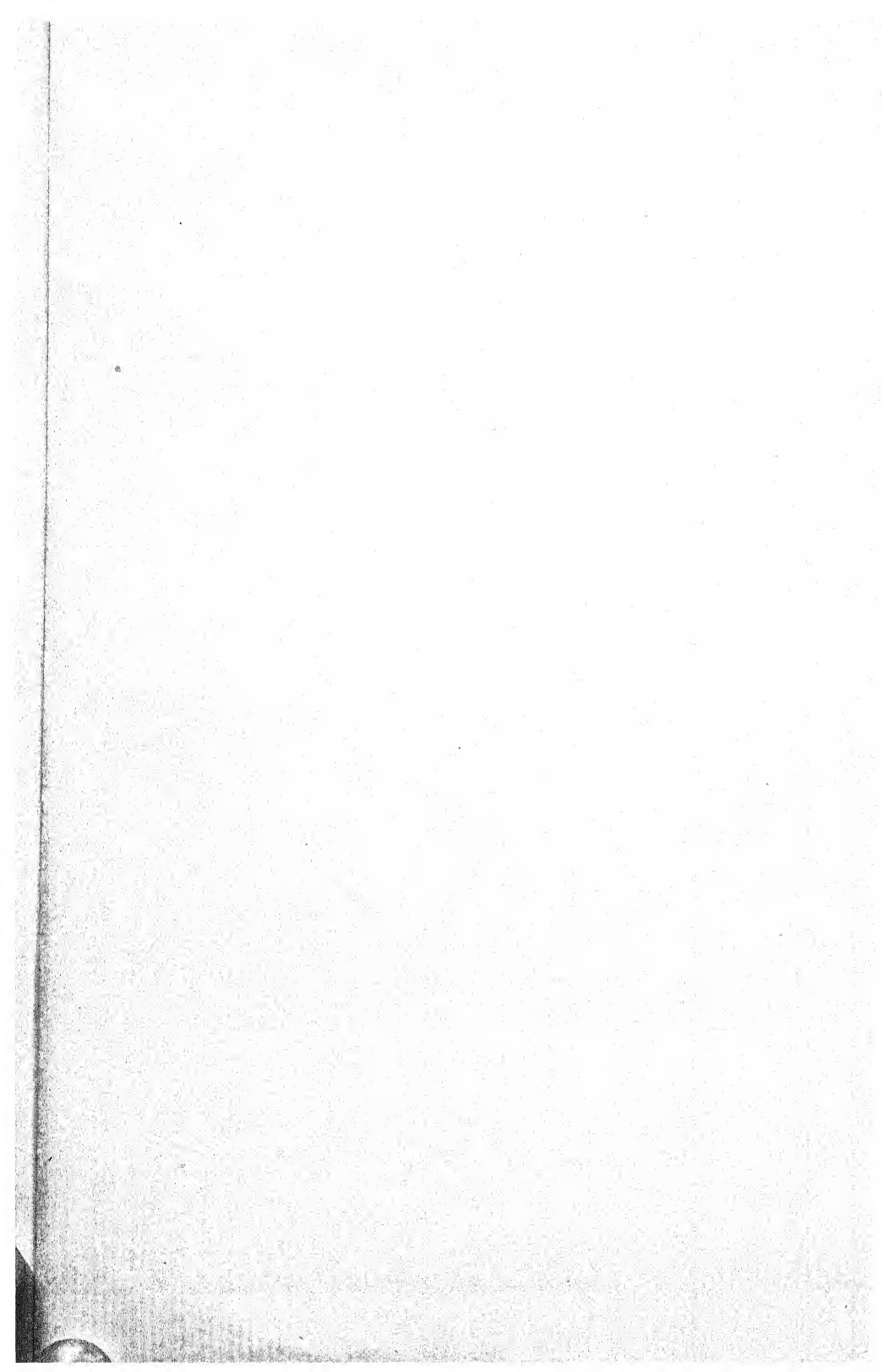
SIDE ELEVATION.



ELEVATION ON X.Y. (SEE FIG. IV.)

Fig. II.

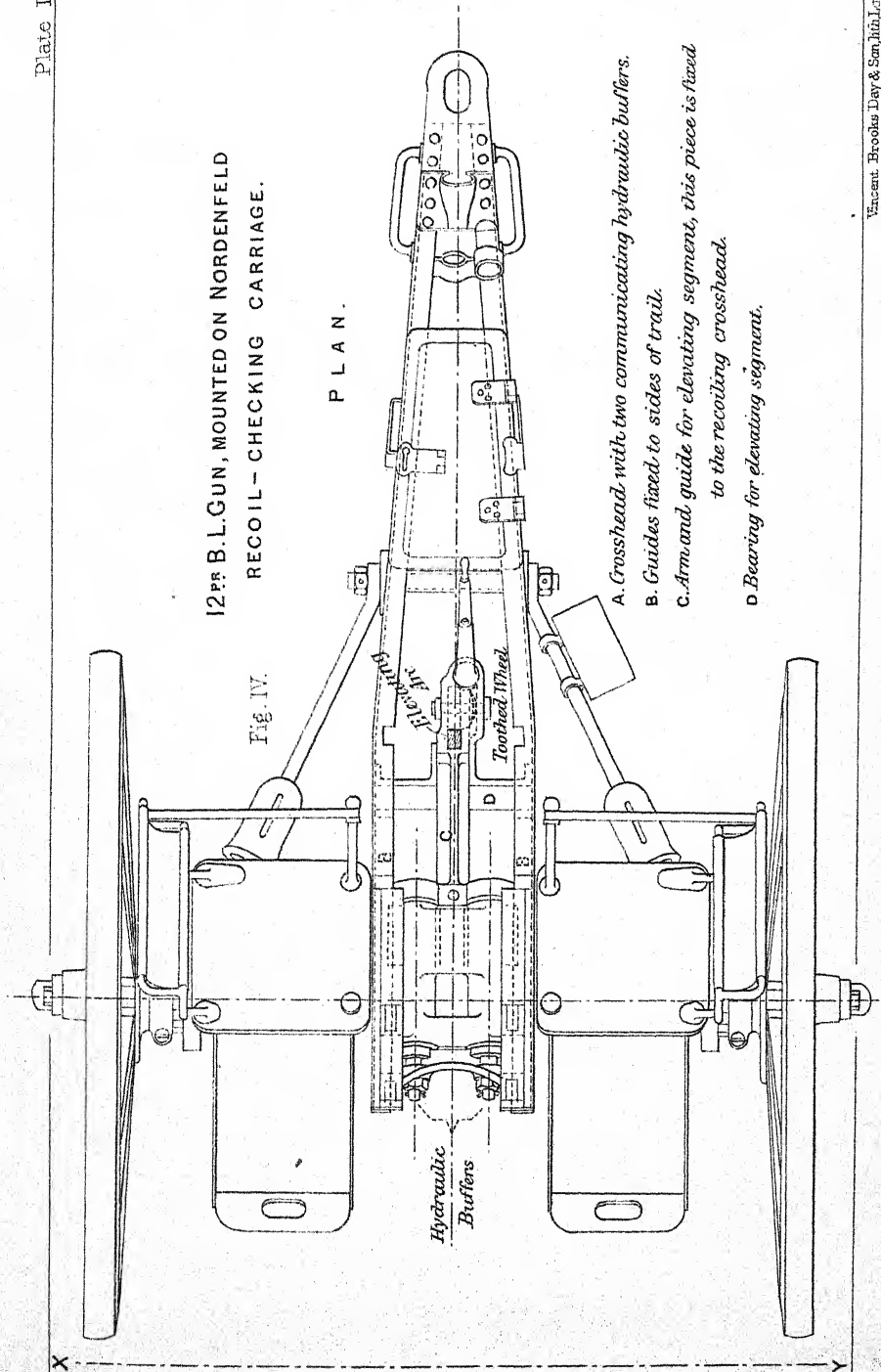




12 PR B.L. GUN, MOUNTED ON NORDENFELD
RECOIL-CHECKING CARRIAGE.

Fig. IV.

P L A N .

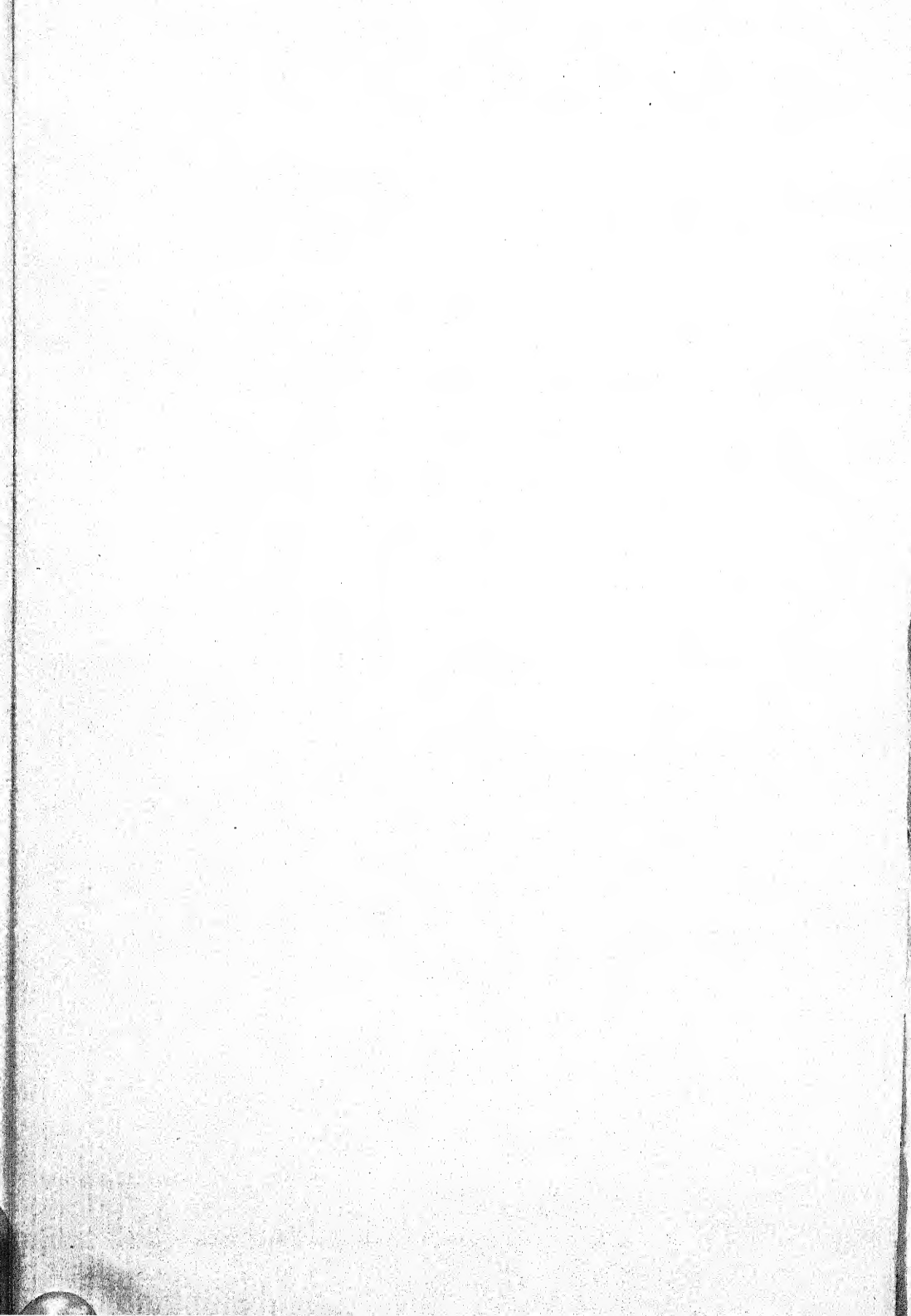


A. Crosshead with two communicating hydraulic buffers.

B. Guides fixed to sides of trail.

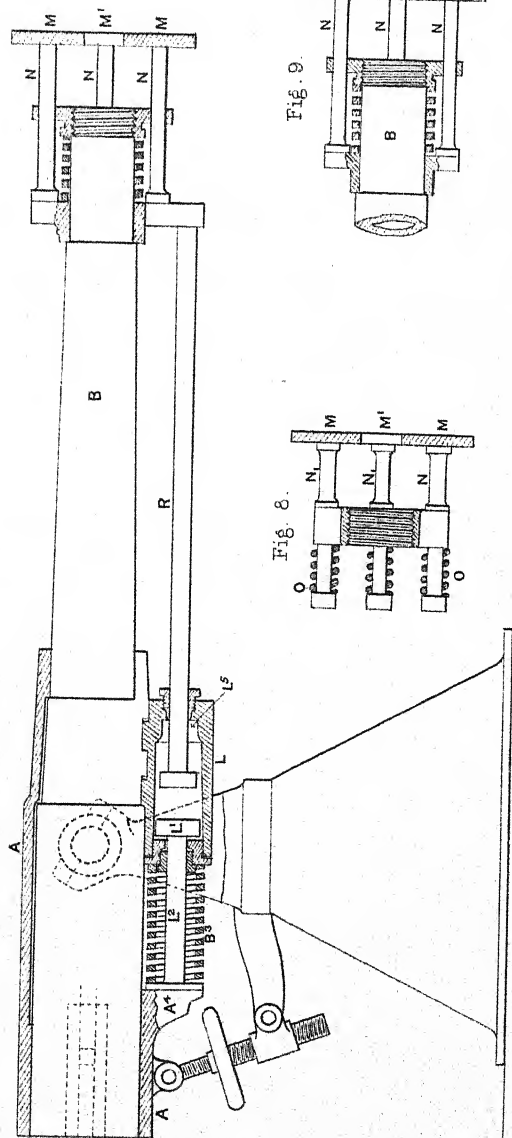
C. Arm and guide for elevating segment, this piece is fixed to the recoiling crosshead.

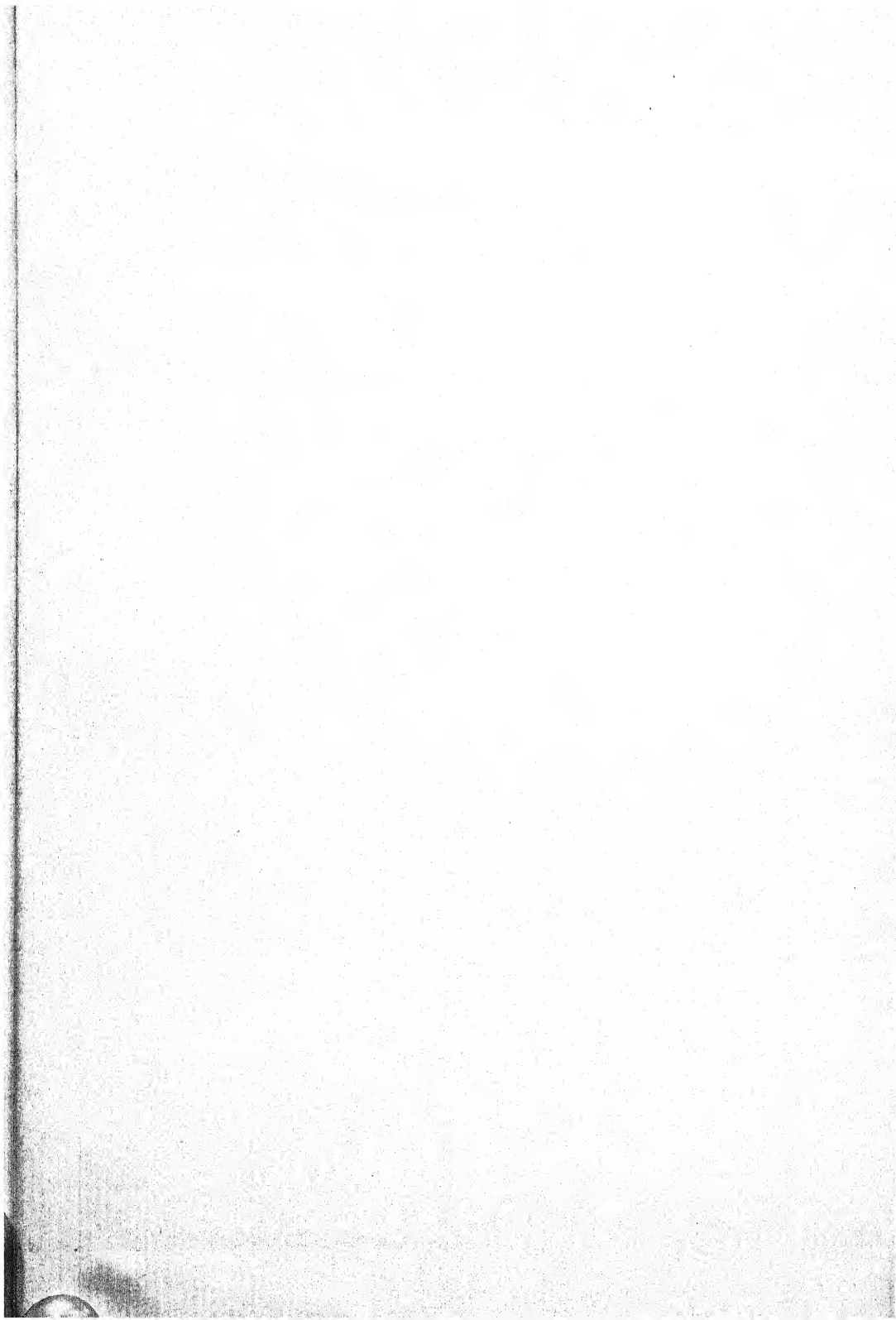
D. Bearing for elevating segment.



MAXIM RECOIL-CHECKING SYSTEM WITH PERFORATED DISC.

Fig. 10.





MAXIM RECOIL-CHECKING SYSTEM WITH PERFORATED DISC.

Fig. 10.

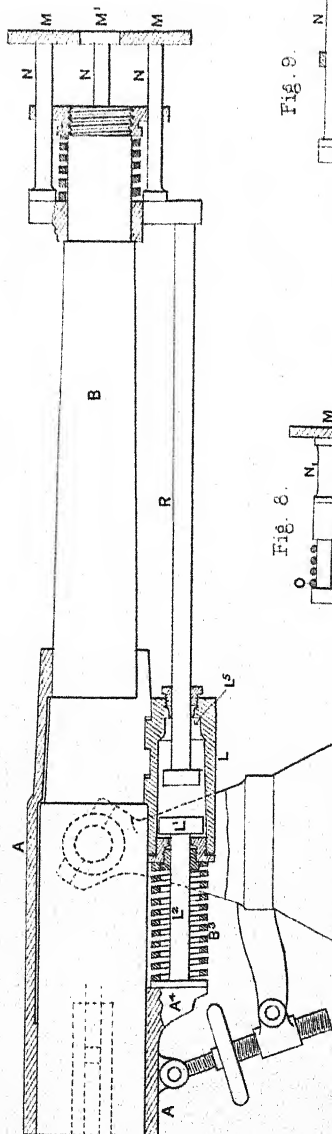


Fig. 8.

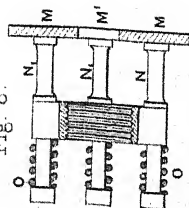
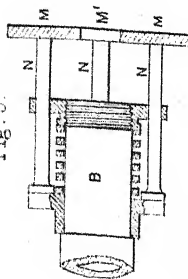
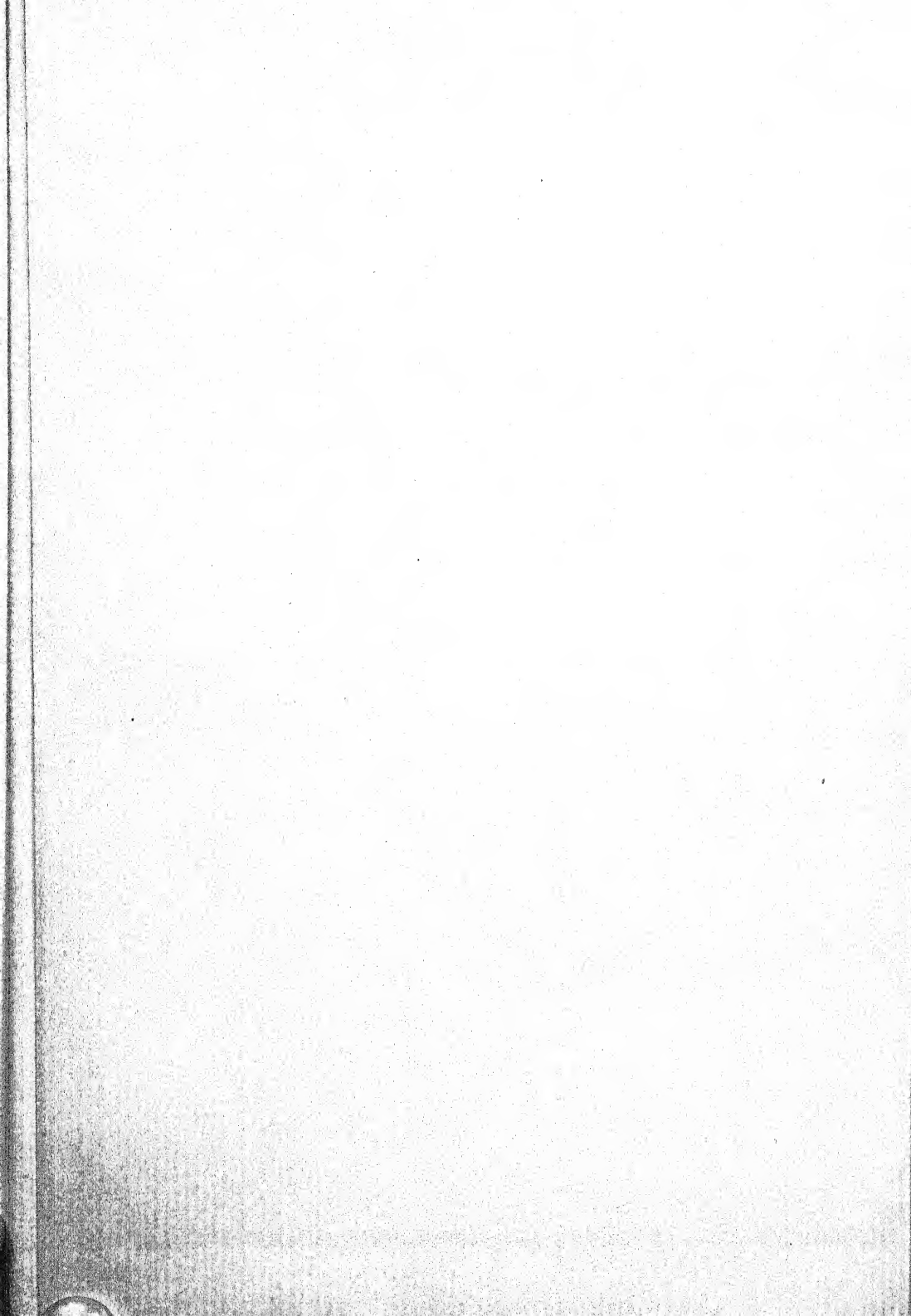


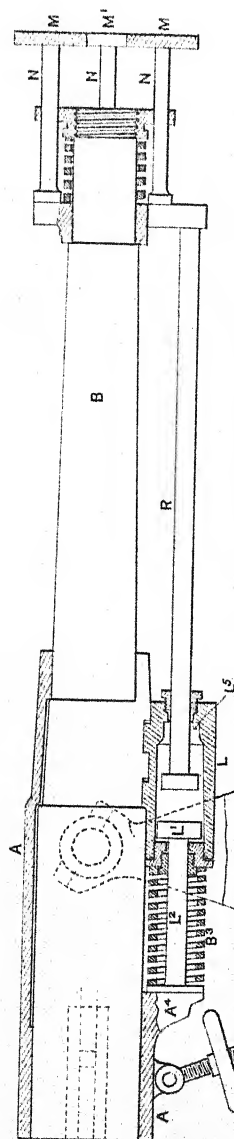
Fig. 9.





MAXIM RECOIL-CHECKING SYSTEM WITH PERFORATED DISC.

Fig. 10.



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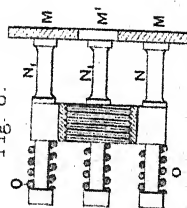
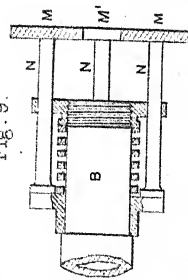


Fig. 9.



HORSE ARTILLERY.

BY

CAPTAIN W. J. ROBERTSON, R.H.A.

VARIOUS ILLUSTRATIONS OF THE WAY HORSE ARTILLERY HAVE BEEN USED.

I SPENT several months this winter in reading Military History, for the purpose of finding examples of how Horse Artillery has been employed in days that are passed. A large number of these cases are probably unknown to your readers, or else have been forgotten; while I believe I am right in saying that they are not to be found in any single work.

All of us are probably more or less acquainted with the proposal of Captain Rosser of the Carbineers to lead a squadron of his regiment and a few Horse Artillery guns after the mutineers at Meerut, and whether the story is true or not, most of us, no doubt, think that had the Cavalry and Horse Artillery been properly used, Delhi would have been saved. The kindred account, however, of how 50 years before Colonel Gillespie had thus saved Southern India from complete rebellion is not equally well known.

The story of the quelling of the mutiny at Vellore is simple. The sepoys in the night massacred most of the four companies of the 69th, the English Garrison of the fort, and took possession, knowing if they could hold it for a single week Madras was theirs. An officer of the 69th, who happened to be on duty outside the walls, heard the firing, learnt what was up, and reached Arcot, where a regiment of British Dragoons were, by the morning.

"By 7 o'clock Coats had told his story; 15 minutes later, Gillespie with a squadron of horse was on his way to Vellore (about 18 miles off). The rest were saddling and mounting; the galloper guns were being horsed and limbered, and a squadron of Native Cavalry was responding to the call with as much alacrity as the British Dragoons.

Once under the walls of Vellore, Gillespie was eager to make his way into the fort that he might rally the remnant of the Garrison, and secure the safe admission of his men. The outer gates were open, but the last was closed and in possession of the enemy. There was no hope of forcing it without the aid of the guns. But these were now rapidly approaching. There were good officers with the relieving force, to whom the conduct of external operations might be safely entrusted, and Gillespie longed to find himself with the people whom he had come to save. So, whilst preparations were being

made for the attack, he determined to ascend alone the walls of the fort. In default of ladders, the men of the 69th let down a rope, and amidst the cheers of the delighted Europeans he was drawn up unhurt to the crest of the rampart, and took command of the survivors of the unhappy force. Quickly forming at the word of command, they came down eagerly to the charge, and cheered by the welcome sound of the guns, which were now clamouring for admission, not to be denied, they kept the mutineers at a distance till the gates were forced, and then the Cavalry streamed in and victory was easy. The retribution was terrible and just."¹

This was the same Colonel Gillespie who a few years later commanded the Cavalry brigade in pursuit of the French in Java, where he had under his command Nobel's Horse Artillery troop (the 2nd raised in India, now F/B, R.H.A.) In the present instance the guns so useful were Cavalry gallopers.² I am inclined to think that had they been Horse Artillery they would have reached the walls of Vellore as soon as Gillespie himself and his leading squadron. But, however, the guns were manned, the moral of the story is the same, viz., that the Cavalry had to whistle till the guns arrived and claimed an entrance.

The need may yet arise in India for a very mobile force being suddenly called for at a moment's notice. If so, Horse Artillery, which has more than once saved disaster, can only be obtained at nine stations in the whole Continent.

All gunners are aware of Norman Ramsay's gallant exploit with I/A. The following incident is not, I think, so well known:—The battery was 1st Troop, 1st Brigade, Bengal Artillery, the first Horse Artillery raised in India by the wish of the Duke of Wellington, and given by him to a Captain Brown, on whose willing shoulders fell the task of proving what the Arm could do.

The incident is described in the words of Captain Melville, an eyewitness, and occurred in the Afghan Campaign of 1841 at Cabul. The battery is now A/B, the same that fought so well at Ahmed Keyl under command of Colonel Warter.

Sergeant Mulhall was killed at Gundamuck on the 13th Jan., 1842.

"Here, amidst so much that was condemnable, let me again bear just and heartfelt testimony to the behaviour of that brave though small body of men. . . . I allude to Sergeant Mulhall and six gunners, sword in hand they awaited the advance of the foe, and it was not till they saw themselves alone in the midst of thousands of the enemy, that they dashed at full gallop, cutting their way through them down the hill, and though surrounded by Cavalry and Infantry, yet they managed to bring their gun safely to the plain, where, how-

¹ From Kaye's Sepoy War, Vol. 1, Page 230.

² To each regiment of European Dragoons in Madras was attached from the Foot Artillery—1 Lieut.-Fireworker, 1 Sergeant, 1 Corporal, 1 Syrang, 2 Tindals, 20 Lascars. And to each regiment of Native Cavalry—1 Sergeant, 1 Gunner, 1 Tindal, and 18 Lascars. The gunners were taken from the regiments and presumably the drivers too, but of that I can find no trace.

ever, only three of them being alive, and they desperately wounded, they were obliged to leave it, and contrived to reach cantonment."¹

India owes a debt of gratitude she can never forget to Horse Artillery. Let me give an example of this from the battle of Sobraon fought in 1846 by Lord Gough. In his despatch he says, "In their efforts to reach the right bank through the deepened water, the enemy suffered from our Horse Artillery a terrible carnage."

But he does not say how near the guns were to not being used.

The following extract explains this, and is to be found in Buckle's History of the Bengal Artillery in a foot note to page 512 :—

"For the severe punishment inflicted on the Sikhs during their retreat across the river, we are indebted to the singular forethought and cool calculating judgment of the Governor-General. Owing to the paucity of Artillerymen, men had been taken from the Horse Artillery to serve the heavy guns in the field, and the troops, three if not four, to which they belonged, were left behind in camp. The services of these troops would have been lost to the army on the 10th February, had not Sir Henry Hardinge, while the battle was yet raging, ascertained that the ammunition of the heavy guns was nearly expended, and deduced from this misfortune, the more than fortunate conclusion that the Horse Artillerymen would soon be again available for their proper duties. He accordingly sent back orders to the troops left in camp to move down without delay to Rhodawallah; and they were brought down by their drivers alone to that post, where they found their own Artillerymen waiting for them and were galloped into action."

I think we will all agree that these men earned their day's pay.

The battle of Sobraon naturally recalls to us Chillianwala. In this engagement six troops of Horse Artillery took part, three on the right wing under Colonel Grant, and three on the left under Colonel Brind.

The following is told by Captain Nolan, and must have occurred to a team of Christie's troop who were on the extreme right with, unfortunately, Cavalry in front of them :—

"A Sikh, after the retreat of our Cavalry at Chillianwallah, galloped up to the Horse Artillery, cut down and killed the two men on the leading horses of the gun, one after the other, and approached the third, a cool fellow, who seeing how badly his comrades had come off with their swords, instead of drawing his, stuck to his whip, with which he flogged off his assailant's horse, and thus saved himself."

Colonel Malleon, in his recent work, "The 15 decisive battles of India," thus speaks of the battle of Gujrat :—

"Upon the British line halting in line with this village the Sikh guns opened fire. The distance however was too great to allow it to have effect, and when the Heavy Artillery of the British replied, it was found necessary to move forward to closer quarters. The British advanced then to a nearer but still too distant position. Just at that moment the Horse Artillery of both wings, displaying that splendid

¹ Buckle's History of Bengal Artillery, p. 431.

daring which gave the Regiment of which it formed a part the title to the proud motto *Ubique*, galloped to the front, and careless of the prompt return fire from the enemy's guns, made their presence felt on the enemy's Infantry But in addition to the loss of the Infantry, that of the Horse Artillery who supported them was extremely heavy. Anderson's troop suffered severely, their leader himself falling, whilst Fordyce's troop was nearly annihilated."

Before turning away from India, let me quote the words of Colonel Malleson concerning the Bengal Horse Artillery at Chillianwala :— "Splendid as is the record of that noble regiment, it may confidently be asserted that never did it render more valuable, more efficacious service to its country, never did it tend more to save a rash and headstrong general from the defeat he deserved than on that memorable 13th January."

Sobraon, Chillianwala, Gujrat, are indeed proud memories for the Bengal Artillery, and it is more than likely that India will yet have cause to thank the surviving remnant of its officers for victories still unfought.

Let me now turn from Asia to Europe, from 1848 to 1866. And though it seems like passing from ancient into modern history, yet the gun used was pretty much the same.

In the pursuit of the Austrians after the battle of Königgrätz, occurred the following. It is a good example of Horse Artillery repulsing a frontal attack :—

"As soon as the Austrian Lancers were sighted, Lieut.-Col. Barner gave the command for his regiment (1st Regiment Guard Dragoons) to deploy, which then dashed at full speed on its opponents, headed by Lieut.-General von Alvensleben. The shock was very vehement, both lines meeting each other, so that their left wings overlapped their adversary's right. The Dragoons broke through the ranks of the Lancers, and encircling their right wing, bore it back in hand-to-hand combat towards the south-west corner of Streselitz, whilst on the other hand, the Austrian left wing which overlapped the right wing of the Dragoons, drove part of the latter back, and dashed on past the east side of Probus in pursuit of them. In the meanwhile, however, Captain Caspari's battery of the 16th Division (1st Horse Artillery of the 8th Regiment) had come up to Probus, and resolutely advanced to the brow of the hill in face of the coming attack ; it now stood unlimbered at this spot. Reserving his fire until the Austrian Lancers were in his immediate neighbourhood, Captain Caspari then received them with such a fire of grape that only a few Lancers, unable to turn their horses, dashed in between the guns of the battery, and then made a wide circuit to rejoin that part of their regiment, which was then being pursued towards Streselitz. A second charge of a larger body of Lancers, which followed behind the left wing of the 1st Austrian line, were also repulsed by Captain Caspari's grape fire.¹

¹ German Official Account of 1866, p. 283.

In "Letters on Artillery," by Prince Kraft zu Hohenlohe, we find on the first page :—

"At Schweinschädel, the 3rd Battery of the Horse Artillery of the Guard, held its own with its six 12-pr. S.B. guns against 16 Austrian rifled guns."

The following is the occasion referred to, and is taken from the German official account :—

"While the troops were occupied in collecting their dead and wounded, it seemed as if the enemy again meditated an attack. The Cavalry Brigade of the Guards trotted up to the "Schaferei," southwards of which its battery took post The battery of the Guards first turned its fire on those detachments of the enemy that were visible in the foreground, and then on some columns on the Josephstedt road 1500 paces off, as well as on a battery at 1800 paces distance, which was soon reinforced by a second battery."¹

1800 paces seems a long distance for S.B. guns to compete with rifled guns, yet they did so satisfactorily.

The actions of Tobitschau and Rokeinitz are in some senses Horse Artillery engagements; out of the four batteries engaged, three were Horse Artillery. The losses on the Prussian side were small :—

The Infantry lost 4 officers and 127 men.

The Cavalry, 7 officers and 100 men, with 113 horses.

The Artillery, 1 officer and 6 men, with 10 horses.

But the loss on the Austrian side were very heavy, amounting in all to 1956 men.

Noticing the very hard work of some of the horse batteries, I selected one, and extracted all that was said about it.

This is the diary of the 2nd Horse Artillery battery of the 6th Field Artillery Regiment on the 15th July, 1866. (Taken from the German Official Account) :—

The battery bivouacked at Kosteletz on the night of the 14th, and marched off at an early hour (about 4 a.m. probably) with the Cavalry Division of General von Hartmann. At Kralitz the Division met the 3rd Infantry Brigade, and soon after 9 a.m. the battery was sent forward with the other Horse Artillery battery to reinforce a Field Battery in action, which was firing at 24 Austrian guns at about a range of 1700 yards or so. At 10.30 a.m. the enemy's guns were withdrawn, and the Prussian batteries ceased fire.

While this was going on, "The Brigade² of Cuirassiers at the head of the Division despatched the 5th Squadron on in advance to find a place for crossing the stream. The A.-D.-C. of the Division, Lieut. von Rosenberg, had, in the meanwhile, discovered a bridge somewhat higher up between Birkerfritz and Klopotowitz, and riding further on noticed that the large Austrian battery west-ward of Wirowan was

¹ Official Account 1866, p. 154.

² 1st Regiment of Cuirassiers—4 squadrons.

5th " " "

without any Guard. As soon as he reported this circumstance, Lieut.-Colonel von Bredow led the three squadrons of the 5th Cuirassiers that were still with him over the very shaky bridge.

Guessing his motive, General Hartmann (Cavalry General of the Division), planted the two Horse Artillery batteries on the right of the Blatta, southward of Klopotowitz from where they could engage the enemy, draw his attention off from the Cuirassiers and assist their attack. As soon as the latter had crossed the bridge, they advanced to the charge, which was led by the 2nd Squadron, the 4th followed as left echelon, the 1st as reserve on the right flank. The undulating ground afforded some shelter until the squadrons were close up to the guns, and the discharges of grape which they received at the last moment did not prevent their entering the batteries. The guns on the left wing had time to limber up, but were overtaken, and only two escaped.

A squadron of the enemy advanced from Nenakowitz, but was driven back by the 1st Squadron, and lost some prisoners.

By this successful charge, 18 guns, 15 limbers, 7 ammunition wagons, 2 officers, and 168 men, fell into the hands of the Cuirassiers, who themselves lost only 10 men. It is clear that as only 10 men were lost in all on the Prussian side, that the Austrians must have been taken in by the feint, and were firing on the R.H.A.

After this, the other Horse Artillery battery crossed the Blatta, but the 2nd Horse Artillery battery proceeded with General von Hartmann and the 4th Squadron 10th Lancers to Tobitschau. From here they proceeded to Tranbeck where they fed, having watered on the way. At 2 p.m. they started off again with the 2nd Light Hussars and three Squadrons 2nd Hussar Regiment. At 3 p.m. the ford over the March was passed, and the battery sent forward (presumably at a gallop) 1200 paces to open fire on some Infantry beyond. The Light Hussars formed line on the right of the battery and charged the Infantry who had formed square, the account saying—"The order in its ranks had been much shaken already by the shells of the battery."

The battery then advanced 700 paces while a series of small Cavalry engagements were being carried on, and opened fire on two battalions at the east outlet of Rokienitz. "These successes now induced the 2nd Line (2nd and 3rd Squadrons 2nd Hussars) to join in the engagement," they proceeded to attack these two battalions. Strong parties of the enemy now appearing in front, General v. Hartmann ordered the recall, and the battery fell back on Webowetz, some 1500 paces or so.

Another Cavalry engagement then took place to extricate the squadrons in advance, who were retiring on the battery. The ground was left about 5 p.m., and the battery bivouacked westward of Tobitschau.

The battery was thus in action five separate times. It had fired at Artillery the two first times, at Infantry the third and fourth, and at Cavalry the 5th. It began one action at 9 a.m. and the other at 3 p.m., and had three long marches in the bargain.

The Franco-German war of 1870-71 abounds with examples of the use of Horse Artillery. I give an account of the work of No. 1 battery (Horse Artillery) of the 1st Field Artillery Regiment, attached to 1st Cavalry Division, on the 18th August, 1870, under the same General von Hartmann. It is curious to see the way a battery thus attached alternately works under the orders of the Cavalry Brigadier and the officer commanding the Corps Artillery.

The battery had bivouacked with the Cavalry Division on the right bank of the Moselle, but was brought to the left at Corny early in the morning, and shortly after moved off for Rezonville, reaching it a little before noon.

While the 15th Division was deploying at Gravelotte, the 1st Cavalry Division had advanced from Rezonville in rear of its left wing and had temporarily taken up a position to the west of Malmaison. While the Cavalry thus stood idly the battery had unlimbered at General von Hartmann's order, in order to assist the batteries of the VIIIth Corps, the bulk of which were in action here. Its escort followed it (a squadron of the 3rd Cuirassiers). While here, it formed one of a line of seven batteries, three on each side of it.

While engaged thus, the first Cavalry Division moved on across the well known defile or causeway; on perceiving which Capt. v. Selle limbered up and followed in column of divisions. He managed to get on to the causeway between two batteries of the the VIIth Corps; but while still on the high road received an order from General von Hartmann, who was retiring with part of his division to reverse, which it did under a continuous down-pour of projectiles of all descriptions. The Division about 4.30 p.m. resumed its previous position to the south-west of Malmaison, while the battery advanced afresh into the line of fire of the Artillery of the VIIIth Corps. They bivouacked that night at Rezonville.

The above is taken from the official account.

They lost in the day, 1 man and 12 horses killed; 2 officers, 28 men, and 20 horses wounded. The number of rounds fired were 693. The only damage to matériel reported was a breech-piece.

The following are two good examples of reconnaissance work. Also from the official account:—

"General Count Lippe had moved further down towards the Chiers with the Saxon Cavalry, and as long lines of wagons were seen from the Amblimont heights to be moving along the road on the opposite bank, while Douzy still appeared to be occupied by the enemy, Major-General Krug v. Nidda advanced with the 23rd Cavalry Brigade towards this village. The 17th Lancers leading the advance were received with fire; but the Horse Artillery battery which unlimbered to the east of Mairy, after a few rounds forced the French Infantry, still remaining in Douzy, to retire. The Saxon Lancers now traversed the village, and on the further side of it, found a wagon column, the escort of which, some 300 men, were occupying the bush-grown heights. Col. v. Miltitz at once sent his 1st and 2nd Squadrons on either flank,

and launched the other half of the regiment partly in close order against the enemy's front, partly in open order towards the wagons, the drivers of which were endeavouring to effect an orderly withdrawal. The Lancers penetrated into the ranks of the hostile Infantry, and cut down part of them; they were ultimately, it is true, compelled by the vigorous and unceasing musketry fire from the bushes to retire upon Douzy, but they had previously succeeded in preventing the wagon columns from driving off by unhooking the teams. The squadrons which had moved on the flanks also withdrew again to Douzy The loss of the Saxon Lancers amounted to 3 officers, 6 men and 18 horses; the enemy had sustained a loss of about 80 men taken prisoners and 40 killed and wounded.

Horse Artillery in Reconnaissance firing at trains.—31st August.

"The continuous despatch and arrival of railway trains to and from Donchery and Sedan led to this portion of the line being cannonaded by the Horse Artillery from Frenois. In consequence of this, the French despatched no more trains for the present, and commenced to evacuate the Sedan station on the left bank of the Meuse, after some Prussian shells had burst in it.¹

This is a curious case of Horse Artillery being used as Cavalry. It may have been, and certainly would be as a rule, a mistake. The Cavalry being here the auxiliary Arm and termed the "escort."

"Meanwhile intelligence had also been received that the two Prussian Cavalry Divisions (5th and 6th except the two Horse Artillery batteries) were no longer following the enemy. But as, from the statements of the prisoners and other reports, it was still possible that the adversary might be overtaken, General von Hoffmann gave orders for the 15th Dragoons (attached to v. Hoffmann's Division) with the two batteries of Horse Artillery (mentioned above) to move off at once in pursuit from Novion Porcien, and for the remainder of the left column of march to follow subsequently in the same direction The Dragoons . . . found traces of the retreat of the French along the road through Mesmont Wesigny and Givron. Some stragglers were captured, *the detachments of the 1st Horse Artillery battery attacked a small body of Infantry which was hurrying away, and captured several prisoners.* When the leading detachment of Dragoons arrived before Chaumont-Porcien, towards noon, it was fired upon by French Infantry which had established themselves in the gardens surrounding the town. By order of General von Hoffmann, the two batteries, escorted by the Dragoons, now unlimbered on the height west of Givron, and brought their fire to bear upon the town in front and upon the hollow road leading to Leogny, through which the enemy was

¹ During the cannonade by the Prussians the train from Mézières traversed the line of rail between Donchery and Sedan The unexpected cannon shots caused great consternation among the Zouaves (the 3rd being in the train). This train was not stopped. Vol. 2, Part I., p. 299.

seen to be in retreat. This fire was not answered by the French Artillery."

The Prussian Infantry came up later, having marched 18 miles under the pouring rain and along very bad roads.

The above extracts are from the official account. Now, let me give some from Captain Hoffbauer's "German Artillery."

Horse Artillery in Reconnaissance.—15th August.

The 6th Cavalry Division under the Grand Duke of Mecklenburg, reconnoitred on the right bank of the Moselle, on the morning of the 15th; the right and left Divisions of the 2nd Horse Artillery battery, Captain Wittstock of the 3rd Brandenburg Field Artillery Regiment attached to it, taking part in the subsequent combats.

The right division under Lieut. von Gizychi starting from Verny at 5.30 a.m., joined Colonel Count Gröeben's detachment, consisting of 3rd Lancers and one squadron 6th Cuirassiers, at Pournoy le Chétif. This force reconnoitring between the Seille and Moselle, ascertained that the right bank of the latter river was unoccupied by the enemy, who had abandoned several intrenchments during the night. But the position of a French camp below Moulins-les-Metz was discovered by signals made by the enemy, although Fort St. Quentin was hidden by the thick mist which rose from the Moselle valley. The guns were directed to open fire on the camp at a range of 2300 paces from a position at Bredin Farm, 100 paces from the railway embankment. The account given by the Artillery engaged is that after the first shells struck the camp, the whole of the troops in it were on the alert, and taking to flight, ran wildly into the adjoining woods for protection. The guns in consequence frequently altered their range which varied from 2200 to 2800 paces and continued to fire until the whole camp was abandoned. They expended 48 shells in all. Fort St. Quentin fired three rounds and then ceased firing, probably because it could not see in consequence of the mist This affair is mentioned in French accounts. V.D. states—"Towards 8 a.m. a German battery having advanced as far as Frescaty farm, threw some shells into the large body of troops on the road between Longeville and Moulins. Fort St. Quentin soon compelled it to retire, but in consequence of this bold step the Emperor decided on removing to Lersy." According to another French account, the first German shell which fell into the camp, burst among three French officers, who were quietly breakfasting, and killed two of them, severely wounding the third.

The left Division of the battery under 2nd Lieut. Hederick, was attached to Major von Heszberg's detachment of one squadron 15th Lancers and two squadrons 6th Cuirassiers.

The column broke up from Verny at 5.30 a.m., and the Lancers forming the van and followed by the guns, advanced along the road by Ponilly to Metz. On arriving at the point where the railway crosses the road, part of the Cavalry was left behind to observe the

road to Metz. The account given by the Artillery further states :—
“The Division turned out of the road to the left, and advanced at a trot in the direction of Montigny. As the station there was occupied, and trains were leaving with troops and forage, Lieut. Hederick received orders to open fire on them. In consequence of the conformation of the ground, it was necessary to approach within 800 paces, and after a few rounds a building forming part of the station appeared to be on fire. On this the enemy advanced, lining the hedges and buildings with skirmishers, and opened a brisk fire on the battery.

The guns consequently retired 500 paces, in pursuance of orders, and shelled, with apparently good results, the buildings from which the enemy was firing on the advanced Cavalry posts. Having attained its object, the reconnoitring detachment withdrew along the left bank of the Seille to Marny The battery (Division) expended 24 shells in all and lost a horse in its first position.

The 6th Cavalry Division had only one Horse Artillery battery, hence we read of Divisions, R.A., acting independently.

It was a good day's work for four guns.

The following shows how seldom guns were intrenched, from so much notice being here taken of it :—

“ ‘the 1st Field Division will cannonade Fort Queuleu to reduce the casualties to a minimum, the guns will be intrenched with considerable intervals between them, for which purpose a pioneer company will be attached’ The wagons remained under cover in rear of the ridges, and some batteries were in pits constructed by the pioneers The shells fell generally in rear of the Prussian batteries causing some damage to the wagons.”

It also shows, I think, where the wagons should not be placed.

SUGGESTIONS FOR A TACTICAL INSTRUCTION FOR THE FIELD ARTILLERY.

BY

CAPTAIN J. M. GRIERSON, R.A., D.-A.-Q.-M.-G.

IN an article under the above title by Major J. K. Trotter, in the March number of the "Proceedings," the writer, in summing up, gives as his second *desideratum* that "we should have a suitable name for the tactical unit, and, at the same time, a re-arrangement of the names used in the Artillery," and proposes that what is now known as a "Brigade-Division" should be termed a "Battery-Section," a "Division" a "Sub-Division," and a "Sub-Division" a "Gun-Section." The change is undoubtedly most desirable, but I would venture to point out, as Major Trotter also notices, that the word "Section" has a definite meaning already attached to it both in Artillery, Cavalry, and Infantry drill, and that this re-adoption of the word, in compound form, is merely stepping out of the frying-pan into the fire.

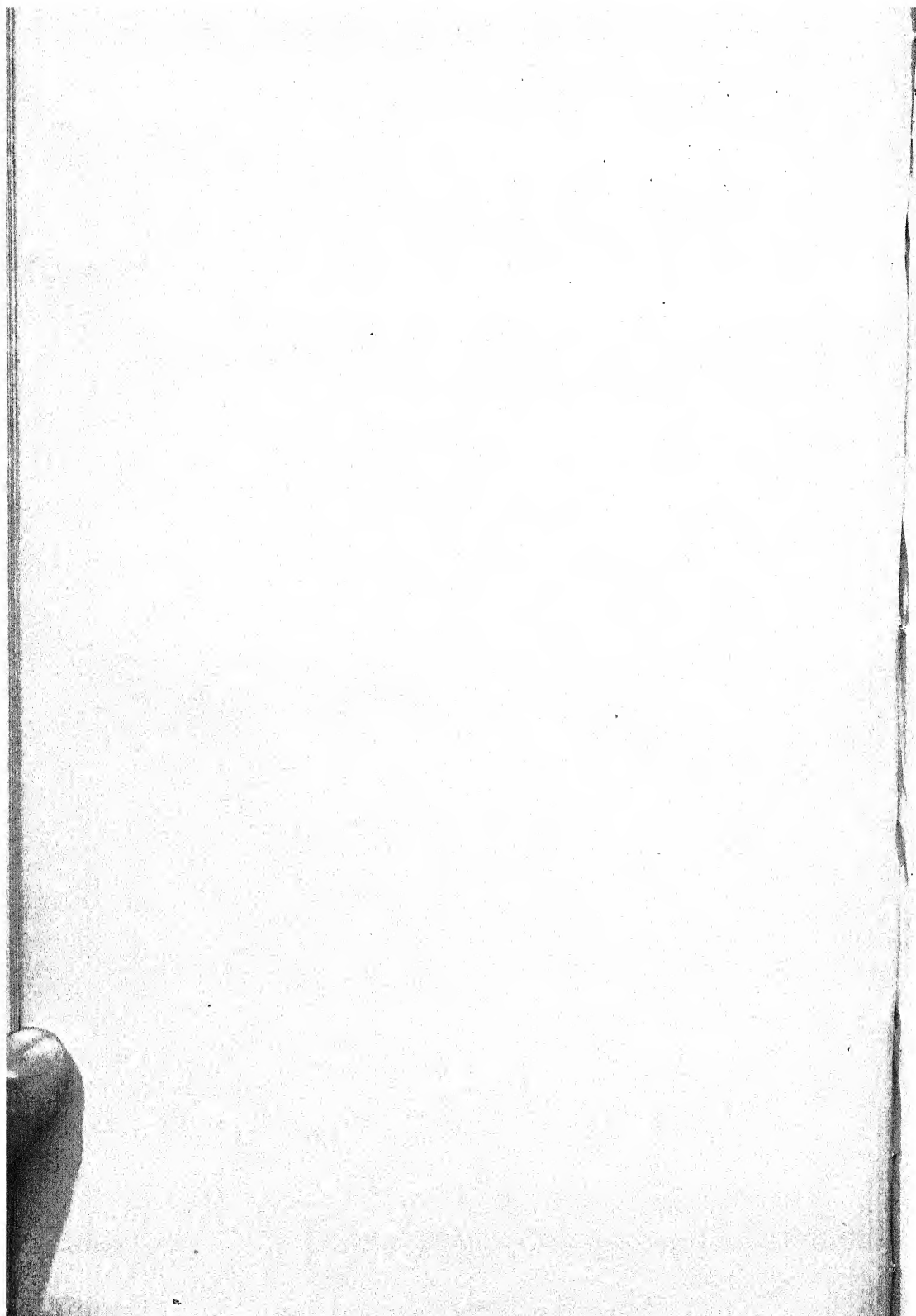
It would seem to me more to the point to have the word "Section" in its present acceptation in mounted drill, to call the "Section" of Infantry a "Troop," and to re-introduce into Artillery nomenclature two good old Artillery terms with a somewhat changed signification, calling a "Brigade-Division" a "Battalion," and a "Division" a "Troop." The sub-division could then be called a "Half Troop," a "Squad," or, better still perhaps, a "Gun." The tactical sub-divisions of the three Arms would then stand:—

		Infantry.	Cavalry.	Field Artillery.
1st Unit...	...	Brigade.	Brigade.	Brigade. ¹
2nd " ...	...	Battalion.	Regiment.	Battalion.
3rd " ...	...	Company.	Squadron.	Battery.
4th " ...	...	Troop.	Troop.	Troop.

¹ All the Artillery of an Army Corps.

The word Division would then be only applied to its legitimate use. It will be objected that a "Battalion" of Horse Artillery is an anomaly—too much of an Infantry term perhaps, but in the old days a "Battery" was a purely Field Battery term, and still it has been adapted to Horse Artillery uses. "Battalion" would soon follow.

I venture to offer the above suggestion for what it is worth.



as they found to hand, and passed the river on it ; but material of this kind will not be found everywhere, while the cavalry have no time to spare to receive full instruction in pontooning and pioneer duties, unless they neglect their own peculiar duties and become simply bad cavalry. For in the scheme of instruction laid down for the cavalry, each day and hour is told off for some duty, and serious consideration must be given as to whether and when this arrangement should be disturbed. In any case the cavalry will not be able to pass their guns and waggons over the bridges which they make, while, as has been already pointed out, they cannot do without them if they are to act independently for any time.

The duty of the cavalry at the beginning of a war, immediately after it has been declared and the mobilization is completed, will certainly be to push on for considerable distances (but not for more than one or two days), into the enemy's country, and to spread out their antennæ as far as possible, making reconnaissances, covering the front and screening the army, exactly in the same manner as they did in 1870.

11th Letter.

CONCERNING THE DIFFICULTIES AGAINST WHICH CAVALRY
HAVE TO CONTEND.

IF we closely examine the claims which are made, and must be made, upon cavalry, in consequence of the most recent inventions and experiences, an anxious doubt comes over us whether such demands can possibly be fulfilled, especially when we compare them with what used to be accepted as the normal efficiency. In former years, before Wrangel in 1843 gave the first impulse to an increased mobility of cavalry, a charge extended over 800 paces, including the walk, trot, and gallop. We now demand that cavalry shall pass over about four-and-a-half miles at the more rapid paces (trot and gallop), and shall then still have sufficient left in them to make a charge and carry it through.

In former times a march of 18 miles in a day was considered to be a hard task for cavalry; we now expect them to be able to march 31 miles a day for at least 2 or 3 days together, and there are even instances where detachments have got over greater distances in a day; for example, the Dragoons of the Guard on the 30th of June, 1866, and 150 men of the 6th Thuringian Ulan regiment on the 15th July, 1866, who marched 58 miles. Stuart's cavalry also marched as much as 50 miles in a day.

In former days the cavalry patrols rode at most from one to two miles in advance of their picquets. We now see officers' patrols march up to 90 miles in a day.

We used to hold it as a principle that cavalry fire-arms were to be used only for signals. I can remember a proverb on this subject; "the infantry soldier who is shot by a cavalry man must believe in destiny." Now we demand that cavalry shall be able to carry on systematic dismounted action, and the history of the last war gives us many instances where dismounted cavalry have not only defended villages but have even captured them.

If I picture to myself the appearance presented by a squadron of less than 40 years ago, when it, as an exception, decided to jump once the "ditch" or the "bar," and compare with it the manner in which the recruits, during the exercises preparatory to working in open order, now chase each other over ditch and bar, playing at "follow my leader," I seem to be looking at the cavalry of a totally different army.

The difference is so great, that one of our old cavalry officers and finest riders when I asked him, after the inspection of a squadron with which he was much pleased; "what would you have said, when you were a lieutenant, if a senior officer had called upon you to do what has been done to-day as a sort of game?" answered laughing; "we should have locked him up in a lunatic asylum."

It is certainly not easy to get from cavalry all that we demand. Neither zeal nor exertion are sufficient of themselves. For by over exertion in the training we may break down the bodily and mental strength of officers, N.C. officers and men, and ruin the horses. It is of no use to allow extra

forage, for overworked horses will not eat their corn. I once knew a captain of a squadron (he was for the first time training his squadron in every detail), who worked so zealously day and night in his stable during the whole winter, that he at last grew seriously ill. The result of all this trouble did not come up to his expectations. The men were, like himself, evidently overworked. The horses were tucked up, some of them even screwed, and all so thin and weak that they could not do their work. Taught by this misfortune he in after years held to a regular system and did excellently well with the same squadron.

The horse is an animal with sense and a will of his own, but as a foal he is awkward and clumsy ; he must therefore be taught to move and to carry a weight, and must be broken in so that he may exactly obey the will of his rider ; this will not injure his frame, but on the contrary will strengthen and consolidate it. We know how many years of study and of work and effort must pass before an officer is sufficiently acquainted with the nature of a horse, to be able to properly conduct the breaking-in of remounts. And when with the greatest care and with all knowledge he has taught his horses to obey exactly the will of their riders, he perhaps finds at the end of the training that he has spoiled the natural action of some horse by overworking him, or has, owing to having kept the horses too long in the school, no time left to get them into condition. Or on the contrary his wind and action may be all right, but the horse is not sufficiently trained or handy, and is too much inclined to want his own way, when he is brought out into the open and put at his jumps. Nothing is more difficult than to hit off the right mean and to attend at the same time to his breaking-in, his training and his food. Some people say that every circus rider knows how to break in a horse. But no circus horse was ever in sufficiently good condition to the work of our cavalry horses.

The officer commanding a squadron has at the same time to instruct his men properly. It is not enough that he should, like the officer commanding a company of infantry, make his men into stout soldiers ; he must not only teach them to be good riders and to use their arms, but he must also instruct them in musketry and dismounted fighting, just as an infantry soldier is taught, and, though no one anticipates that in these matters they can be brought quite up to the infantry standard, yet every cavalry soldier must at least learn how to make use of the ground when dismounted and acting on the defensive.

You can imagine how much the demands upon the intelligence of the cavalry soldier have increased since he has been entrusted with the duties of reconnaissance and outposts at all times during the movements of war. But no one who has not had experience of the mental condition of the recruit when he joins the regiment, can guess the enormous amount of trouble which must be taken by the instructing officer, in order to teach a man, as a mounted soldier, to think quietly and clearly, and to make an intelligible report.

In proportion as greater efficiency has been demanded from the cavalry in these matters, more has also been required from the individual man and horse. At one time squadrons used to use only certain selected horses for patrols since most of them would refuse to leave the ranks. Now every horse has to be trained to go by itself in open ground, and if two or three horses in a squadron are found not to be trained to leave the ranks, the captain will certainly be brought to book.

The Sisyphus-like labour of the officer commanding a company is hard enough, but that of the officer commanding a squadron is ten times worse.

Moreover greater demands are made upon both his body and his mind. After the longest march, and when both he and his horse are streaming with perspiration, he must, as he gallops along either at drill or in battle, take in clearly the state of the action, keep his eye steadily upon the enemy and upon his squadron, give the right command at exactly the right moment, and order the correct calls to be sounded. He has no time to think, for it is frequently a matter of seconds. Who has not often enough at the manœuvres seen a squadron, which had been sent out to a flank, not sufficiently well led to come in pat at the moment; and who does not remember how the captain was reprimanded? Some mistake, caused perhaps by the thick dust, with regard to the position of the enemy or of his own squadron, has made him form line at a gallop from echelon of troops, ten seconds too soon or too late, and he thus finds his whole squadron either in front of the line of his own cavalry as they charge, or the length of a squadron too far away, leaving a gap in the line. When the charge is over everyone sees his blunder, and all who know nothing of the difficulties of his task, throw up their hands in the air, and say how marvellous it is that he cannot do what he has practised a hundred thousand times.

The very affection which a captain bears to his squadron makes it difficult for him to lead it. Officers commanding companies may be angry with me for saying it, but it is true that a good captain of cavalry is more closely attached to his command than a good captain of infantry. This is because their training has cost him more trouble. Above all he loves his horses. This may sound unnatural, but it is human nature. Just as a mother loves that child best which it has cost her the most trouble and care to keep alive and to bring up, so the captain of a squadron gives more affection, and more pains, to the troublesome unruly *horses*, than to the more easily managed *men*. Moreover a horse remains ten years in the squadron, and a man only three, and thus the horses are as it were the kernel, so that when the captain speaks of his squadron, he especially means the horses.

During the greater part of the year the care and the proper treatment of these animals have absorbed most of his attention, and he has taken care that "Donna," who is a little fidgety, shall be treated gently by her rider, that too much weight shall not be thrown upon "Tancred's" forehead, that "Belisarius's" feet shall be well looked after, that "Omar's" legs are carefully hand-rubbed, and that "Sultan" is not pulled up so short as to produce a spavin, &c. Some day he is called upon to work his squadron, either in regimental, brigade or divisional movements, at the manœuvres or in war. He must then, without any thought for his darlings, turn his whole attention to the enemy and the tactical situation of his squadron, and must be prepared to sacrifice the whole of it if necessary, without regard to what may become of Donna, Tancred, Belisarius, Omar or Sultan. What must be his feelings when he has to lead this squadron, upon which he has spent ten years hard work, into the storm of the enemy's bullets! No care for his own life will disturb his choice of the right moment for action, but he cannot help thinking of his darlings. He must expose them to destruction. In spite of himself he doubts, and the doubt obscures his judgment. "How" he says to himself, "if this is not the right moment; I might perhaps do more good by demonstrating, by manœuvring, or even by falling back and thus save to the army all this valuable strength?" Much of the hesitation, much of the indecision of cavalry leaders, who by them have

lost the opportune moment, has been due to this thought, and not to the instinct of self-preservation, which a German officer never allows to influence him in battle. The officer commanding a squadron must shake off all the infinite number of cares which weigh upon him, when he, forming his opinion purely upon tactical considerations, wishes to take advantage of the moment for a charge; he must feel much as my friend B. (who is now dead), felt in action, when, after having ordered a squadron to charge the flank of the enemy, he cried rather irreverently; "now God and the world may do what they like with me! Keep your lances low! Gallop! Charge! Charge! Hurrah!"

The difficulties which trouble the mind of a general commanding cavalry are yet greater, though of a slightly different character. The officer commanding a squadron can, even during a movement, interfere here and there, he can correct mistakes with his voice, and can exercise a personal influence. With a great mass of cavalry this is impossible. The officer commanding a cavalry division can do nothing, even by means of his aides-de-camp, when once the mass is in motion, and when their blood is once up. He must grasp the exact moment, and at that moment must give short but precise orders, for as soon as they have started in a swinging gallop, his influence is gone. He may see how here his orders have been misunderstood, or how there some unforeseen obstacle, or some precaution taken by the enemy, may render a change necessary; but he can do nothing. With a beating heart, and with heavy care, he is obliged to trust that his subordinates may do what is right of their own accord, while he has to bear all responsibility, whether victory or defeat be the result of his orders. How very much more comfortable is the officer commanding an infantry division! He can always send in time to such and such a battalion, or even to any company, if he sees that his orders or his intentions are not being carried out. The officer commanding a cavalry division has no such power. If he has not given his orders at once clearly, positively and briefly, he will have no opportunity of explaining them afterwards.

The commander of a large mass of cavalry must unite in his person so many extraordinary qualities, that no one who realises this can wonder why it is that a Seydlitz is seldom seen. But we need not therefore renounce the useful assistance of cavalry; only we must congratulate ourselves when a cavalry leader, even though not perfect, is found to be, at any rate to some extent, equal to the discharge of the duties of his arm.

Just as a cavalry leader has far greater trouble than a general of infantry in working his troops according to his wishes, so also is he exposed to far greater dangers. I am not speaking of personal danger, for this is no danger at all (the grandest fate that a general can desire is to fall on the field of honour, and to give his life for his king and fatherland); I am speaking of danger to his honour and reputation. One order misunderstood, one trumpet-call wrongly comprehended, may ruin his fame for ever.

General Trochu (in a work published nearly twenty years ago and which attracted much attention at the time), described, under the head of "panics," how the bravest troops may under certain circumstances be seized with a panic; and what he there relates of cavalry he must have seen himself, since he tells us exactly without disguise into what a state of disorder even good cavalry may fall owing to a very small misunderstanding.

Every one who has read it will sympathise with that unfortunate cavalry leader who rode forward with the leading squadron to reconnoitre, while the main-body followed through a wooded mountain defile. He had hurried forward the battery of horse artillery with the leading squadron, and they unlimbered on the bare hill which was at the mouth of the defile. The noise made in shutting the lids of the limber-boxes sounded through the narrow valley to the troopers in rear like six rifle shots, and they thought that infantry were firing quite close to them, and that they were defenceless against them in the defile. In the meantime the scouts who had been pushed forward reported that the village in their front was not held by the enemy, and the battery according to regulation, sounded the "cease firing!" This was repeated threefold by the echo in the valley, and was mistaken by the cavalry for "fours about!" Their belief in the danger which threatened them was strengthened by the second slamming of the lids of the limber-boxes, which again resounded through the valley like rifle shots, and as the battery, wishing to follow the advanced squadron, now sounded the "Trot!" the whole of the main-body trotted to the rear, out of the, as they thought, dangerous defile. As soon as they had reached the flat ground at the bottom of the hill, the senior officer ordered "deploy by squadrons!" and sounded the "gallop." Part of them heard only the first call, and part only the last. So they all started at a gallop, believing that nothing but a most rapid retreat could save them from some imminent danger. No word of command could be heard, none of the officers could catch up the fugitives since they could not gallop faster than their well-trained men. So without a halt the entire mass fled back for miles before an enemy who had no existence.

The commander of the whole in the meantime was waiting on the hill in front. Growing impatient because the main body did not follow him, he looked round for it. Then over the wooded crest he saw his men galloping away in the distance over the low ground at the bottom of the hill. He was in despair, but he could do nothing, for he was too far away and moreover knew no reason for such disorder.

Or let us imagine the case of the commander of a mass of cavalry, which has been ordered to follow as a reserve to an approaching attack, and who himself hurries forward past the columns of the infantry on the march up to the front, with the object of seeing where he can be of use. He orders his cavalry, if they can do so without disturbing the infantry, to trot past them. This is done. A bye-road is seen, which appears to favour the desired advance, as no troops are using it. But this road really leads in quite another direction. The whole mass of cavalry rides on, and when the commander wants to employ them and sends for them, they cannot be found. The cavalry having arrived at the spot where they hoped to find their commander, cannot find him, and wait during the whole battle for his orders. Or perhaps the general's horse hits his foot against a stone and is so lame that he cannot get on, while his other horses are with the cavalry in rear; or perhaps an aide-de-camp says "right" when he ought to have said "left," and thus a suspicion arises that the general does not care much about fighting. He so loses his reputation and the confidence of the troops, two things which once lost cannot be recovered.

I could give you many other examples, which, like these, would not be drawn from the imagination. I will be content with these, which show by how slender a thread, in the cavalry, that hangs which to every man is the holiest thing he possesses, his honour.

Let us further consider how important in these latter days the duty which is done by officers' patrols has become, since the supreme commanders of the army found their orders upon the reports furnished by them, and how necessary it is therefore that all young officers should acquire a knowledge of tactical and strategical matters, so that they may know how to make a good report, and what to report and what not, distinguishing between what is essential and what is unimportant. Thus the young officer after he has finished his duty with the men, tired perhaps as he may be by riding, drilling, and his other work, must give some time to study; he must spend the intervals between the courses of training in making long reconnaissances, while he must employ his winter evenings at the war-game, and in extending his knowledge by hearing lectures. Thinking of all this we shall realise how great a price he pays for the swagger of belonging to the cavalry; he pays for it by unintermittent work, from daylight till dark, year out and year in.

Moreover mounted duty, including long rides, tries the health more than walking. The lengthened work in the riding-school, with the shakes and jars given to the bowels and spine have in the case of many officers sown the seeds of chronic illness, even during their first year of service as lieutenants, owing to which some of them have been invalided before their time.

Lastly we must mention the sacrifice of money made by a cavalry officer while he is serving. He must always be sufficiently well mounted, to be able to ride faster and for a longer time than the men. It is true that during the last ten years many arrangements have been made with a view to lighten the demands upon the purses of officers, and these are thankfully recognised by them. They are supplied with selected horses as chargers, and unless a man is unlucky with his horse this is enough; if an officer has the bad luck to lose his horse, he is given a gratuity or is supplied with a cast horse. But every cavalry man knows that he thus seldom covers his expenses, for the price of horses is now very high. Every horse represents a large capital. The State naturally does not assist officers when they injure their horses by their own fault. But a young officer, who can know little about horses or riding, is very likely to bring his horse to grief; and is every young cavalry officer to be obliged, if while riding he wants to jump a ditch or a hedge, to take into consideration whether, if he lames his horse, he may not be considered to have done it by his own fault; if this is to be so the most valuable quality of the young cavalry officer, his recklessness and his delight in danger, will be destroyed. It may be accepted as a fact that there is no cavalry regiment in which an officer can live, unless he is prepared to spend £100 a year out of his own pocket. Nothing less than this amount will do for him until he becomes a 1st captain; for as he grows older his needs grow greater; and since he must serve 20 years before he can attain to that rank, we may reckon that a cavalry officer in the course of his service spends £2000, that is to say, he sacrifices that amount to the fatherland.

I am not at all inclined to lay it down as a principle, that quicker promotion should be given on account of this sacrifice of money. Such a proceeding would destroy the bases upon which the excellence of our officers rests. But if an arm, which sacrifices so much money, should receive somewhat quicker promotion than the others, on the ground that, in addition to the ordinary duties, it brings a greater strain on the body and prematurely enfeebles it, we could not grudge it to the cavalry?

12th Letter.

THE DEMANDS MADE UPON THE CAVALRY OF THE PRESENT DAY,
AND HOW THEY WILL BE MET.

I CERTAINLY pointed out in my last letter the difficulties which the cavalry must overcome in order that they may meet the demands made upon them but you quite misunderstood me, if you conclude from what I said that I think that these demands are too heavy.

Speaking generally the essential points of these demands may be summed up in a few weighty words.

A squadron must be able to get over four miles and a half at a rapid pace (trot or gallop), and must then have sufficient power left to make a charge and carry it through.

Certain picked horses must be able to march great distances, say from 50 to 60 miles, in a day, and it must thus be possible to carry out extended patrolling. The officers who command these patrols must be beforehand so thoroughly instructed in tactics, that they can make such reports concerning the enemy and the nature of the ground as may serve for bases for the orders of the supreme commanders of the army.

The larger masses of cavalry must be in a condition to make long daily marches, and should certainly, to give figures, be able to advance for three days at the rate of from 28 to 30 miles per diem. If these marches are to continue more than three days the daily amount should be diminished, and if on any day the cavalry are asked to do more than usual, then the next day must be either one of rest, or only a short march must be made on it.

These exertions, whether of a single squadron or of a cavalry division, must have no influence on the tactical efficiency of the force making them.

This is not too much to ask. The cavalry can do it, have done it, and will do it, whenever they are asked, if only they are allowed the means to do it.

I have already said, in a former letter, that any single squadron which is properly trained can move quickly for four miles and a half and be then fit to charge.

I have also mentioned some reconnaissances during the war, in which individual officers have ridden as much as 90 miles in the day, and have brought back the most important news. I could further give you many cases of officers who, even during mere manoeuvres, have been for 16 hours in the saddle without rest or food, and who yet remained fresh and clear-headed, being supported by their passion for their work.

With regard to the instruction of the officers who are to take charge of cavalry patrols, we may be sure that this leaves nothing to be desired. Not only does the Ministry of War allow reconnaissance rides to be carried out every year by the cavalry of each army-corps, in addition to those arranged for the General Staff (this would not be enough,

it would only serve to teach the instructors), but I have every year seen the whole of the officers of the regiments make once or twice, indeed as often as their training allowed them time, excursions of a few days at their own expense, in order to gain by these journeys a fuller acquaintance with their duties as leaders of patrols; while I know one regiment (which has nevertheless not neglected any of its other points of training, but did most excellently in every respect) which brought its instruction in reconnaissance to such a pitch of perfection, that at the manœuvres every sergeant and many corporals were able to supplement their reports by capital sketches which were done in the saddle.

To one question no answer has ever been given in time of peace; "can a cavalry division march for three days at the rate of from 28 to 30 miles a day, without thereby seriously affecting its tactical efficiency?"

It absolutely must be able to do this. It has been done in war. When an army, leaving its base, sends forward its cavalry, it must expect them to be able to obtain in three days an advance of from two to three days march. The cavalry must then be able to advance from 25 to 30 miles per diem, while the army moves 13 miles a day. (During the advance on Châlons one cavalry division did actually march 28 miles a day). If this can be done the cavalry will gain the normal and necessary advance, and after that they can adapt their marches to those of the army. But they will also by that time, if not earlier, have come in contact with the enemy, and will need the whole of their tactical efficiency, which must therefore not have been injuriously affected by their marches.

This is the only point in which our cavalry has no practice. But practice and system are most necessary for it, in order that these forced marches three days in length may be carried out in large masses with the greatest possible care for the condition of the horses, especially if the march is made in war, against a real enemy, or following out a distinct strategical idea. There are numberless things to be thought of with regard to these marches; these require practice, from which we can learn how best to spare both men and horses and how to render them capable of great exertions.

We may begin by fixing the place of rendezvous. The smaller the body of troops which has to assemble there, the less will be the wear and tear of their assembling. After having discovered and noticed the direction of such parallel roads as exist, a decision is made as to whether the whole division must be collected at one rendezvous, or whether each brigade may assemble at its own. After this comes the assembly. Nothing tires troops more than being much moved backwards and forwards with a view to their assembly. We often see a squadron parade first at its own rendezvous, then it goes to that of the regiment, then to the brigade parade, and the brigade finally marches to the point of assembly of the division. An enormous amount of time is lost by this, and this time must be taken from the night's rest of the troops, and can be entirely saved if by a little practice each small detachment is taught to find its own way to the appointed spot. Even in 1843, Wrangel gave strong orders against this waste of time and strength, and yet the same fault is constantly repeated, and all for want of practice.

Practice and system are also necessary before one can learn to give in the saddle short and exact orders, which omit nothing and leave nothing doubtful. Practice and system are needed moreover in order to judge the proper amount of advance to be given to the scouts.

When the division commences its advance, it is absolutely necessary, if it is desired to march a long distance, say 30 miles in a day, that the horses should not be pressed, and therefore that the pace should be moderate. Great attention must also be paid that the march is made in good order, and that the ranks close well up. But if the regulation distances are exactly observed by the whole mass, then, since stoppages and disturbances of pace are unavoidable, the troops will be constantly opening out, stopping short, and then galloping up, a mode of proceeding which take all their strength out of the horses, for the reason that it excites them. Much practice and system is needed before it becomes possible for a large body of cavalry to trot quietly. It must be laid down as a strict rule that the distance between squadrons shall be elastic, and shall be sufficiently great to prevent any disturbance of pace being transmitted from one to another; it is more important that the squadrons shall move at the same pace as the leading troops than that they shall preserve accurate intervals. But if any interval thus becomes exceptionally large, it must be a part of the system that the rear squadron shall send forward single troopers to keep up connection with the squadron in front, and to make sure that the troops which are following shall not lose their way.

All changes of pace should take place at given hours. In the year 1866 I marched from Poysdorff, near Vienna, by Prague on Berlin with a strong column of artillery, and I directed that the force should walk for half-an-hour and then trot for two miles, and so on alternately; during the first day's march however I walked for a quarter-of-an-hour and trotted for a mile only. In this manner I got over about four miles and a half in the hour. When the march was longer than 18 miles I used in the middle of it to trot four miles at one spell instead of two, after which I walked for a short distance, and then halted for half-an-hour. In this manner we marched our 18 miles in four hours, while the horses and men kept quite fresh, and the former even put on flesh. These were field batteries.

Care must be taken that at the halts the men dismount and mount by squadrons, the moment they are formed up, in order that the horses may not be tired by the men remaining long in the saddle at the halt. It would be a very serious mistake to give the word to mount to the division as a whole, for, if it marched off at the walk, it would be half-an-hour before the last squadron could start.

Judging by the experience gained during my long march from Vienna to Berlin, I should divide a forced march of 30 miles in the following manner: I should start at a walk for half-an-hour, then trot for two miles, then walk for another half-an-hour, then trot for four miles, walk half-an-hour, trot two miles, and then again walk for half-an-hour; I should thus, including a halt of half-an-hour, have marched 18 miles in 4 hours. I should now halt for from 2 to 3 hours, in order to allow the horses to be watered and fed, and for the men to cook their dinners. (I assume that they carry preserved provisions).

The remaining 12 miles can be marched in 3 hours. In this manner the division will have advanced 30 miles in 10 hours.

Owing to the varying nature of the country which will be traversed by such a march of 30 miles, some opportunity will daily be found for deploying the division from order of march into order of battle, and this should be done either against a supposed or a skeleton enemy.

As cavalry manoeuvres are now carried on, an enormous amount of practice is given in the movement of a division in three lines. I have seen some of these manoeuvres last between four and six hours. During

this time from four to six cavalry actions were fought in one day on a larger or smaller drill-ground. But they were all worked from the rendezvous formation. I have never seen them so managed that it was necessary to overcome the great difficulties which attend the change from order of march into order of battle in the presence of an enemy. These difficulties increase when the cavalry division uses several parallel roads, and this is usually the case in war. The cases where the two cavalries at first face each other in their rendezvous positions, and advance thence to the charge, are very rare. Those in which they come into action at once from the column of march are far more frequent, especially when both armies know how to make good use of their masses of cavalry, and send them far to the front to reconnoitre and to screen the army. In this case that cavalry will win the day which best understands how to pass very rapidly from the order of march into the order of battle in three lines. And yet we rarely practice this. The first officer, as far as I know, to start the idea, that cavalry ought to be trained in such a manner that it might be possible to march them across country in order of battle, was General von Radowitz. His idea then (he died in 1853), received no attention. The cavalry of the XII. corps has of later years practised this system at their Manœuvres. I know from a trustworthy source that they thus gained great and most valuable experience, while, as is most remarkable, the charge for damage done which they had to pay did not amount to a third of the rent of their drill-ground. Yet, for some reason which is beyond my knowledge, this kind of manœuvres has not been again attempted. On the other hand the French constantly make their cavalry practise them. The divisions who are taking part in the manœuvres march towards each other from a considerable distance, and the actual combat does not take place until after some few days of preliminary action.

In order to exemplify practically what are my ideas concerning this question, I will now give a description of a system of cavalry manœuvres, which would fulfil my object.

A cavalry division (say the 5 regiments of the VI. corps and 1 of the V. corps), is collected in the neighbourhood of Krappitz in upper Silesia, and is ordered to be in three days in the neighbourhood of Liegnitz. During the first two days it is permitted to carry out any tactical or strategical idea it pleases, on condition that on the second day it shall reach the neighbourhood of Lissa on the Weistritz to the West of Breslau. Placing myself in the position of the officer commanding the division, I should on the first day march by parallel roads over the Neisse to Michelau, and Löwen, collecting my columns at some place into position for combined action against a supposed enemy.

On the second day I should march, with my whole division on one road, from the Neisse to the Weistritz against a skeleton enemy, and should on the way work out an attack in three lines. On the third day the superintending officer should give a general idea for the advance of the division against an enemy, who may be expected from Sprottau on the Bober, and who will therefore be encountered at Liegnitz.

The enemy would be another division (say of the III. corps), which in a similar manner will have been ordered to reach Sprottau during the first two days' march, either from Kottbus or from Guben; it should then be directed to act on the third day against the division which has come from Lissa.

The operations of the third day must end by a combat between the two divisions, and will be followed by a day of rest. After this two days can be employed in the country between Liegnitz and Haynau in working the two divisions against each other, or in impressing upon the leaders the elementary principles of the tactics of the attack in three lines, if, judging by the manner in which the manœuvres have been carried out, this appears to be necessary.

After a second day of rest the two divisions will separate, moving the first day in accordance with some general strategic idea, and will return to their starting points, practising various manœuvres, as they did on their march out.

I do not think that elementary practice of the two divisions in three-line tactics ought to be altogether given up, as was the case on the only occasion when such large movements of cavalry divisions were attempted; for I believe that at such manœuvres many elementary ideas must be proved by actual observation, and that a mere theoretical statement of them is not sufficient. But I do think that in our present manœuvres, as they are now conducted, more time is given up to them than is altogether necessary.

Moreover I consider that the assembly of the divisions and the carrying out of their exercises on one spot are necessary, in order that the highest authorities may inspect the divisions. This would not be possible during the forced marches, without tying the hands of the officer commanding the division by ordering him to rendezvous in some fixed position, and thus ruining the resemblance of the march to one made in war, unless indeed the exertions of the troops during the day were made excessive by holding the inspection during the course of the march. But such an inspection is most necessary, for everything which is not inspected is neglected. All we soldiers know that well.

I am of opinion that plenty of time for the inspection by the senior officers might be found; first, on the third day of the forced marches when the divisions come in contact, and on the two days given over to exercises between Liegnitz and Haynau. Opportunities for elementary exercises can be found on both these days, and also on the six days of forced march, when the general commanding the division, once each day, collects his force for united action.

In this manner the cavalry division (for example, that which marched from Krappitz), would give six days to forced marches, two to manœuvres, and two to rest, in all 10 days, and would then return to the place whence it started.

Will anyone object to this proposition on the ground that the horses cannot make three consecutive forced marches of from 28 to 30 miles? If the horses are in condition and have had plenty of work, they must be able to do this. As I said above, the march takes 7 hours, 4 before and 3 after the mid-day rest. If we allow three-quarters-of-an-hour for coming from and going to his stable, a horse will be eight-hours-and-a-half under the saddle. If the exercises be energetically carried out all unnecessary waiting about will be avoided, so that a horse will not have more than 9 hours work; this is not too much, even if he is made to trot 18 miles, for a horse is tired much more by carrying a weight for a long time than by the pace at which he moves. But ten hours of work for three days would not ruin a horse; many farmers horses do far more than this during the whole harvest. At all events ten hours of such work would injure a horse less than if he, as is often the case at

manceuvres, exercises, and in war, had daily to carry his saddle for from 12 to 16 hours, and this without a feed, while for the greater part of the time he is halted with his rider on his back.

Another question which arises is how time is to be found for such manoeuvres. For I am far from wishing that the cavalry should cease to take part in the manoeuvres of the infantry. On the contrary, I consider that the very closest connection between the cavalry and the infantry is essential, in order that the former may every year renew its knowledge that it exists only for the latter, and may discover what duties it has to fulfil towards the other arm. For this reason I consider that it is very desirable that the full strength of our cavalry should annually take part in the manoeuvres of the infantry, and should not begin their own special exercises until after the others have finished, and when the reserves have been dismissed.

We have laid down above that these cavalry exercises will last ten days. Including one day of rest before and one after, this would imply a delay of 12 days in the discharge of cavalry soldiers, provided that, to take our example, the manoeuvres of the army-corps finished at Krappitz; unless this be arranged these 12 days may easily grow into 14 or even into 3 weeks, and it might happen that some squadrons would not get back to their garrisons until after the middle of October.

I can see no disadvantage in this, for the recruits do not ever arrive until 3rd, 4th, or 5th, of November, and will thus not have exceeded their three years' of service in the second half of October. The cavalry estimates would certainly be somewhat increased by the cost for a few additional weeks of the reserve men and of the horses which are to be cast. But cannot we, perhaps, manage to economise in some other department. If we cannot, then what must be must be, and must be borne, and this excess of expenditure will not be so very great that anyone need object to it, when once he realises the necessity for the measure. It is after all only a question of the cost of retaining about 180 men and 70 horses per regiment for at most about three weeks longer than usual.

There is yet one other question; whether the cavalry can make such exertions without receiving more than the present ration of forage. Would it then be impossible to give them the war ration for the duration of such manoeuvres?

I have thus arrived at the comforting conviction that our cavalry are fully prepared to meet any demands which the army, owing to the improvement of fire-arms, may find itself obliged to make upon them.

13th Letter.

CONCERNING THE DETAILS OF INSTRUCTION.

YOU are altogether right in saying that nothing that men do is perfect. You then urge me to make an end, at last, of my praise of our cavalry, and to state in what I think they might still be improved; I will now do so. Since I am thus compelled to enter into the discussion of cavalry details, I shall be obliged, for this purpose, to give up my original intention to consider the subject from the point of view of the officer commanding a division, who has all the three Arms under his command. I shall, however, confine myself to my own experience as an inspecting officer in command of a division, and shall give the results which I have myself seen.

I will, therefore, dedicate this letter entirely to the details of the instruction of the cavalry.

At the present day the remounts, since they can now be sent almost everywhere by rail, arrive at the regiments in the middle of summer; whereas, formerly, the squadrons used not to receive them until the end of September or the beginning of October. They thus now come under military care and training three months earlier than used to be the case. The result of this is that they are broken in three months earlier. This gain of three months does not appear to injure them in any way. In former days, it was assumed that the four year old remounts were attached to the squadron simply to attain their full growth, and no attempt was made to break them in until the following year. During the whole of this twelve month the young remounts were exercised only so much as was thought necessary for their health, or, at the most, in order to accustom them to the saddle and the weight of the rider. For this purpose it appeared sufficient to give them over to the care of a N.C. officer, and they were not handed over to the officer who had charge of the training of remounts, until after the expiration of the year. But, as a matter of fact, the N.C. officer could not keep the remounts exactly where they were when he received them. A four year old, who is already strong enough to carry a rider, must either be assisted in his development during this important year (in other words his training must begin), or harm must be done to him, and he must be spoiled; at least, there must be some chance that his natural failings, peculiar to his structure or his character, may be developed, and it then will become far more difficult to break him in. As a rule, the last was the case, because the N.C. officer had, generally, no idea how to make use of this year, for the purpose of developing the powers of the horse, and of teaching him obedience at the same time.

The late General von Schmidt deserved, in my opinion, great praise, for having suggested that the young remounts should be broken in as soon as they joined the regiment. A four year old is certainly weak in

his bones and sinews, and he is easily tired; but he is pliant and teachable. It is thus just as easy to make him obedient and assist his bodily development, as it is to make him obstinate and to break him down; it is merely a question of treating him with or without intelligence.

Many regiments took up General von Schmidt's idea, and commenced to break in their remounts as soon as they arrived. I have seen the most astonishing success result from this system. It would have been thought impossible in other districts to make the horses so docile, gentle, willing and familiar with their riders. There was far less difficulty in fully breaking in these half-trained remounts, their shape and their paces were better, they were more fully developed, and they were handsomer and stronger. But this success was entirely due to the fact that the officer commanding the squadron himself, with the assistance of that officer of his squadron who knew most about horses, had from the first day taken the young remounts under his special charge.

The result was very different where this system was attempted by inexperienced hands. In that case it was not rare to find the remounts broken down by their training; sometimes the germs of disease were developed, while sometimes they were so overtrained, that they had already learnt too much and had lost their natural and regular paces. This showed itself in their walk, which was not free, and in which they did not keep their quarters well under them, and also in their trot, which was irregular. This was, as a rule, caused by teaching the horses too soon to trot short and to passage.

The only way to avoid thus injuring the young remounts is to entrust them to the most skilful hands in the squadron; that is to say, the officer commanding and his best officer must take special interest in them. This is all easy enough so long as they are both in garrison. But if the squadron is sent to the manœuvres, then, in that case, the officer who knows most about horses must be left behind with the remounts then present, and, also, to receive those which will arrive. It is hard upon the squadron, and harder still upon the regiment, to have to leave its five best subalterns behind it, at the very time when it desires to show how much it can do. But there is nothing else for it. The horse is the main element of cavalry, the very essence of its efficiency. He must be looked after from the very first, so that he may develop well and become efficient, for, unless this be the case, cavalry cannot carry out their peculiar duties.

In order that I may not be misunderstood, I will exactly state the amount of training which a young remount should have received when he is taken into regular work as an "old remount." Those remounts, which, later on, give the best results as trained horses, are by the end of June or the beginning of July, in about the following stage, given that they joined the *depôt* in the July of the preceding year.

They can trot their natural pace (not the short trot), and can also trot out. They can circle in a spiral and can circle and change. They are of course accustomed to their riders, and obedient to the bridle and the leg; they allow their riders to mount and dismount, or to spring into the saddle; they will leave the ranks and work alone; they can jump a few small bars and ditches, and will, when circling at a walk or a trot, allow their heads to be drawn towards the centre. The highest point that properly trained young remounts can be expected to attain, without injuring their paces or their legs, is to break in succession from the trot

to the gallop while circling, and to advance in line at a gallop. In every case in which the training has been pushed on at this time farther than I have mentioned, for instance, to the "Shoulder in," to passaging, to breaking into a gallop from a walk or by the word of command to the whole, some harm has been done to the horses, and either their paces or their sinews have been injured by overtraining. Considering the use which it is intended to make of the horse in the future, it is more important to gradually teach the young remounts to trot for a considerable distance in line, than to make them bend or passage. A long trot quiets a horse, and makes him attentive to the aids. Of course it is possible to carry this to an excess, and to break down a young horse by over-working him. Nothing but practice and experience can teach the exact mean, and the best manner of breaking in a horse.

The recruits join the squadron about the beginning of November, long after the remounts. I have no criticism to make with regard to the principles which govern the winter training of cavalry recruits in riding. So much importance is attributed to this branch of instruction, not only by all thoughtful cavalry men, but, also, by anyone who knows anything about it, that, though it may be carried out in a more or less complete manner, according as the instructor is better or worse than others, yet the principles of it are always correct.

On the other hand I have been often astonished to observe that the cavalry, in the dismounted training and instruction of their recruits, have not made the same improvement in their system as the infantry have, with the object of obtaining the same striking results. The colonels of regiments and the officers commanding squadrons are certainly right in considering that the dismounted movements of cavalry are not of such importance as those of infantry. But every soldier ought to acquire a regular military bearing; many recruits join the regiments so badly set up and so mentally dense, that they are almost like animals and have to be made into men before anything can be done with them. The infantry, which has only to look after the training of men, has discovered a way of making the clumsy recruit into a soldier, which is far more progressive in its action, more mild in its means, and more rapid in its effect, than the old system of severe discipline and drill. This begins with instruction in the articles of his equipment and with gymnastic exercises, the latter being carried on in comfortable canvas clothing. When the recruit has become accustomed to his surroundings, has lost his early shyness and discomfort, and has, thanks to the gymnastics, acquired a certain amount of pliancy of limb and of soldierlike bearing, so that he can march fairly well, then, and not till then, he receives his tight uniform and learns his drill. This system increases the trouble and care of the instructor during the first fortnight, since he has to take into account the individuality of each recruit; but he finds his reward in time, for after this the progress of the men is far more rapid, and their appearance is far better, than if, as was the old fashion, the wretched clumsy peasant had been forced on the very first day to endeavour to hold themselves properly, and had been tormented by learning the slow march, until they had cramps in every muscle.

It has always astonished me that the instructors of the cavalry, who show such matchless patience with their horses and teach them gradually how to use their limbs and how to move, have no patience at all with their men, but expect peasants, porters, and cobblers to be able to march on the very first day, exactly as if they were educated men. We are told

PRÉCIS
AND
TRANSLATIONS.

INVALIDE RUSSE.

TRANSLATED BY
CAPTAIN E. LAMBART, R.A.

THE PASSAGE OF RIVERS BY SWIMMING.

THE following account of a successful night attack carried out by the assistance of a squad of swimmers, appears in an article under the above heading in the *Invalide Russe*.

After Suvarroff had cleared Piedmont of the French, the allies arranged a new plan of operations against the French Republic in Germany and Italy.

This plan was as follows :—The Russian troops concentrated under Suvarroff in Switzerland, were ordered to burst into Franche-Comté; the Austrian army concentrated near the Fortress of Mannheim on the Rhine, under the Archduke Charles, were to take possession of this fortress, and to assist the operations of Suvarroff and the Duke of York, who was advancing from Holland into Belgium; while the Austrian army remaining under Melas in Italy, finally drove the French out of that country. The Archduke Charles was ordered, without delay, to advance from Schaffhausen to Mannheim. But in order not to expose the Russian Corps of Korsakoff at Zurich to defeat, in detail, the Archduke left 15,000 men under Hotzo in small cantonments on the River Lint, and 10,000 under Nassendorf at the junction of the Aar and Rhine. The Army of Massena was established with its right flank at Laachen, its centre on the Austrian Alps, and its left on the Lumot. The right flank consisted of Soult's Corps of about 15,000 men. This Corps occupied the left bank of the Lint, on the right bank of which was the Austrian Corps, under Hotzo, of 15,000 men. The Archduke Charles marched to Mannheim on the 20th August, while Suvarroff marched out of Italy from Ast on the 31st. Korsakoff, before the arrival of Suvarroff, was left to act against Massena; exposed to defeat in detail by the latter, Massena did not delay to take advantage of the favourable opportunity, and concentrated 40,000 men to attack Korsakoff, and ordered Soult to attack Hotzo. The army of the latter occupied completely the right bank of the Lint. His outposts extended beyond that river, which, on account of its great depth and width, had its left bank very marshy, its right steep and banked up. At the disposal of Soult there were only two rotten boats, fit to contain about 15 men each. The laying of a bridge was attended by serious difficulties. A successful attack on the Austrians in front presented little probability of success to Soult, as the Austrians, in Soult's opinion, could—not moving from the spot—easily drive back into the water any French division which should risk the crossing, all the more that the means of crossing were very insufficient. Therefore Soult tried to

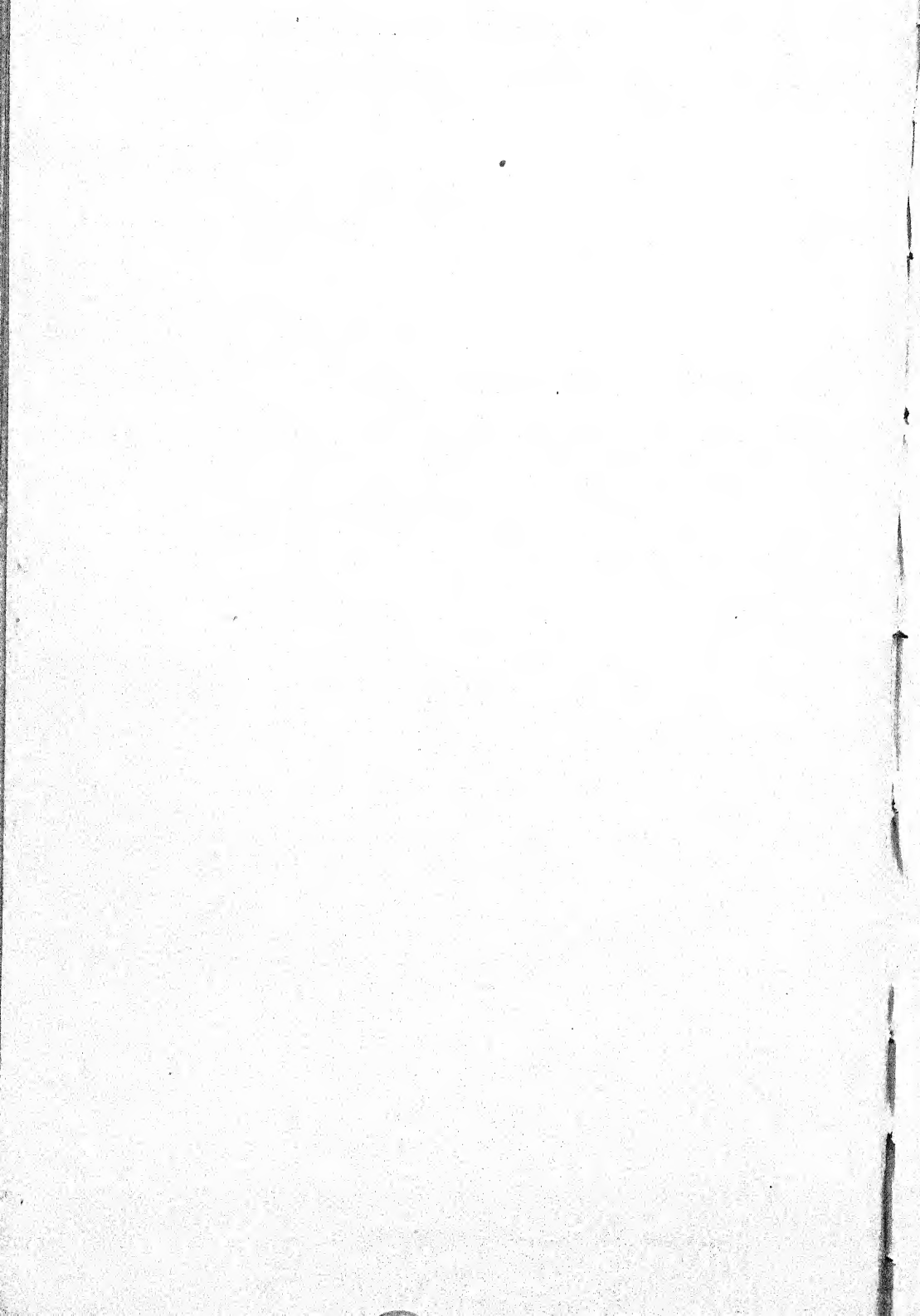
discover a way to fall on the Austrians unexpectedly. This means was suggested to Soult by Captain Delar, who proposed to pass over at the head of all the swimmers of the corps, to capture suddenly the redoubts which were erected on the right bank of the Lint, to spike the guns, kill the gunners, scatter the garrison, to turn the guns on the Austrian camp, and to create an alarm there by making a noise, and thus causing confusion everywhere. The French troops, in the meanwhile, would be able to throw over a bridge, and, crossing over, finish the defeat of the Austrians.

Soult having thought over the plan of Delar, on the following day gave his consent to it. It was resolved to pick out the swimmers of the whole corps. The number of them in all amounted to 250 men. Collecting them in the village of Laken, Delar made a company out of them, accoutred them with halberds, pikes, sabres and pistols, and gave out to them 10 drums and 4 horns. The swimmers were taught to use the arms given them, to swim by command and by signal, and in formations by night—keeping touch and order. This preparation was carried on for 15 days continuously. After that Soult reviewed the squad. If up to then he still doubted of success, after this inspection he confidently counted on the successful issue of the adventure, when he saw how the 250 swimmers swam a long distance on a lake, without entangling themselves with their weapons and without confusion. For two days before the impending attack against the Austrians, Delar carried out a reconnaissance of those places on which it was intended to operate. In company with a spy he went through—in several directions—the marshy and deep swamp which formed the left bank of the the Lint. He remained at this river till midnight, quietly swam over it, landed on the enemy's bank, lowering himself to the level of the water, looked round thoroughly to see how the enemy's advanced posts were distributed, their strength, how far from the posts they kept their sentries, the distance between the posts, where it was best for the swimmers to land, where it was most convenient to steal up to the posts and seize the redoubts, &c. All the information obtained in this way Delar explained to Soult, and returning to his squads, took measures to keep them in readiness. The squads were kept together, armed and fully prepared. Just before the attack Delar received his orders from Soult, and in the evening collected his party at the village of Bilten, about two English miles from the selected crossing place— $2\frac{1}{2}$ hours after midnight the swimmers were to carry out an attack. They were all ready by midnight. The men told off put on the arms as Delar had taught them—a pike on the left shoulder, sabre on the left side, a pistol and greased cartridges on the head; the pistol and cartridges were bound up in the middle of their clothes, of which the ends were fastened under the chin. Each of the weapons had its special object, the sabre which they had to keep in their teeth when crossing, served for the attack on men, the pike was intended for hand to hand fighting, and the pistol to create greater confusion in the darkness by firing. The halberds and drums were to increase the noise and to sow disorder and dismay in the ranks of the enemy. At midnight Delar conducted his people to the edge of the water. There was a keen frost, although before this there had been a thaw, and in consequence of the melting of the snow the water had increased, and the ditches in the marsh had overflowed. At midnight the whole of Soult's Corps arrived at the village of Bilten and began to form in view of the impending attack. Delar, with his squad, marched at one hour after midnight, and after taking all precautions that they should not lose the way in going through the swampy marsh, and keeping to the paths previously reconnoitred, successfully reached the river at 2.30 a.m.

Having formed up his squad Delar gave them the following instructions, reminding them that a happy issue would bring them immortal glory; he ordered them not to take prisoners, but to slay without mercy all who came into their hands, to collect to his signal on the other bank, and then to follow him,

remembering that he would always be at the head. He gave out as a watchword "Victory or Death." With these words he quietly slipped into the water, having near him the seven officers. The squad followed behind the officers. It happened to a few to reach the other bank very low down, a few others perished. Delar himself first got out and climbed the bank, from which he gave the signal agreed on. Whilst the squad were assembling an ensign succeeded in creeping up to the sentry so quietly that he did not alarm the post. Recognizing quickly his bearings, Delar knew it was only necessary for him to capture advanced posts and after that there opened a wide interval, and he could without being noticed, not only make his way through to the redoubt but even to the rear of the battalion guarding it. He sent word to the swimmers to climb up the bank where it was overgrown with rushes, which gave them concealment. Besides, the attention of the enemy at this time was diverted to the left bank of the Lint, where the Corps of Soult had arrived and begun preparations for making a bridge. The Austrians heard the noise and opened fire from their trenches. Delar with his swimmers halted at 50 paces from the redoubt. Taking their pikes the squad rushed into the fortification and threw the surprised Austrians into complete confusion. Some, losing their heads, threw themselves into the river. The first redoubt, the most dangerous for the crossing of the French, was taken. It was indispensable to capture the other to increase the confusion, and to make easy the problem of crossing the Army Corps over. Then, in order to inform his own side of his success, Delar gave a shout from the rampart of the captured redoubt. The French army hearing the shout, worked hard to hasten the crossing in order to hurry to the assistance of the successful squad under Delar. But the latter, not losing time, attacked the other two Austrian redoubts, which shared the fate of the first. The garrison was killed, the remnants of it dispersed, the guns spiked. Meanwhile, Soult commenced the crossing of his forces by two (leaky) boats, which conveyed with difficulty 15 men each, they would probably not have reached the enemy's bank, if the swimmers had not arrived in time to assist them. Whilst Soult carried out his crossing under these conditions, Delar, having carried the third redoubt and the intermediate trenches, and cut in two the foremost troops of the Austrians, threw himself on their bivouac, when all was yet serenity and calm. The firing, the furious shouts, the rattle of the drums and the noise of the clarions, roused the Austrians, who, hearing the shouts of "*We are betrayed—sauve qui peut,*" dispersed in alarm and dismay. These shouts were uttered by Delar's squad. Thus in a few minutes a division of 10,000 was cut in two. The greater portion in panic-stricken flight, fled to Shoniss, where were the head quarters of General Hotzo. Seizing his sword, Hotzo himself ran out into the street. All his attempts to collect and form up his troops were in vain; wounded by one of the swimmers he still would not leave his place, but tried to restore order to his troops, till a grape shot put an end to his life. It is necessary to observe that the French opened a fire of grape shot on the flying Austrians, and in the confusion killed some of Delar's men, who were hotly pursuing the crowds of Austrians. Thus, Delar's squad of swimmers carried out its undertaking successfully. The difficult crossing under the close fire of the enemy, thanks to the energy of the swimmers, was carried out with little loss, and the enemy occupying a strong, almost impregnable position was dispersed in complete rout with a loss of 5,000 men. These results speak for themselves, and require no comment.

FERMOY,
April, 1888.



NOTES:

BY VARIOUS HANDS.

EXTRACT FROM A LETTER BY LIEUT. H. A. BETHELL, R.A.

My plan of (on emergency) hooking the lead and centre horses of the wagon into the wagon body, pole draught, has just been tried both in this battery and D/2 with great success. You lash a spare shaft to the perch, hook a couple of swingletrees into bights of the drag chain passed between platform board and foot board, and hook in the centre horses (with the lead traces *at full length*.) *à la* Major Gambier.

We found this arrangement ride very well over nullahs and rough ground, in fact better than the limber by itself, and there was no tendency to tilt over backwards.



CRICKET, 1883.

ROYAL ARTILLERY, WOOLWICH, v BLACKHEATH C.C.

19TH MAY.

BLACKHEATH.

Mr. F. H. Lacey, c Hall, b King	69
Mr. J. F. Green, b Wheble	8
Mr. F. S. Ireland, c Cooper, b Wheble ...	1
Mr. A. Daffen, not out	38
Mr. F. G. Monkland, b Curteis	18
Mr. L. Stokes, st Cooper, b King	19
Mr. M. J. Druitt, b MacMahon	20
Mr. K. Christopherson, c and b MacMahon...	13
Mr. E. C. Fraser, b Wheble	0
Mr. A. E. Plunkett, b Wheble	0
Mr. E. W. Sampson, run out... ..	3
Byes, 6; leg byes, 2; wide, 5	13

Total 202

ROYAL ARTILLERY.

Mr. E. S. Cooper, c and b Druitt	10
Capt. de Robeck, c Monkland, b Druitt ...	0
Mr. J. Haggard, b Daffen	72
Capt. Wheble, b Druitt	10
Capt. Curteis, c Christopherson, b Fraser	45
Mr. C. D. King, not out	49
Mr. MacMahon, b Druitt	1
Mr. C. Cooper-Key, c Monkland, b Druitt	7
Capt. Simpson, b Druitt	1
Capt. Hall, not out	6
Mr. H. Jenkinson, did not bat	
Byes, 22; leg byes, 5; wide, 2	29

Total 230

ROYAL ARTILLERY v. ALDERSHOT DIVISION.

25TH AND 26TH MAY.

1st Innings.		ROYAL ARTILLERY.		2nd Innings.	
Capt. de Robeck, b wood	...	0	not out	...	0
Bombr. Barton, b Caunter	...	0	b Caunter	...	62
Mr. T. Best, run out	...	0	run out	...	0
Capt. Wheble, b Bowen	...	35	b Arnold	...	21
Mr. J. Haggard, b Rice	...	27	b Rice	...	16
Mr. Adair, run out	...	36	c Dunn, b Wood	...	1
Mr. Chamier, b Rice	...	0	not out	...	15
Mr. Crampton, b Caunter	...	28	b Rice...	...	0
Mr. Cooper, not out	...	11	c and b Wood	...	39
Mr. Calley, b Caunter	...	0	b Caunter	...	3
Mr. Herbert, b Wood	...	7	b Dunn	...	8
Byes, 7; leg byes, 10	...	17	Byes, 9; leg byes, 7; no ball, 1	...	17
Total	...	161	Total	...	182

ALDERSHOT.

Capt. Rice, O.S.C., b Barton	...	35
Mr. Bowen, 60th, b Wheble	...	23
Capt. Caunter, Welsh Regt., c Barton, b Herbert	...	49
Mr. Dunn, 8th King's, b Crampton	...	168
Surgeon Trask, b Adair	...	10
Capt. Staunton, Gordon Highlanders, b Wheble	...	1
Mr. Duncan, 4th Hussars, b Herbert	...	6
Capt. Birkbeck, Royal Scots, b Haggard	...	18
Mr. Podley, West Kent Regt., c and b Crampton	...	26
Mr. Arnold, 18th Hussars, b Barton	...	9
Capt. Wood, R.E., not out	...	0
Byes, 9; leg byes, 8; wide, 2	...	19
Total	...	364

OFFICERS, R.A., v NON-COMMISSIONED OFFICERS.

2ND JUNE.

NON-COMMISSIONED OFFICERS.			OFFICERS.		
Sergt. Dovey, c Haggard, b Pratt	...	27	Lt.-Col. Hutchinson, b Hunter	...	18
Bombr. Paitson, b King	...	11	Major Anstruther, c and b Paitson	...	43
" Cochrane, b King	...	0	Mr. Haggard, b Paitson	...	10
" Barton, st de Robeck, b MacMahon	109		Mr. C. D. King, b Paitson	...	0
Sergt.-Major Hunter, b King	...	43	Capt. Curteis, c Spence, b Hunter	...	8
Sergt. Howard, c Hutchinson, b King	...	38	" Wheble, c Polson, b Paitson	...	8
Qr.-Mr.-Sergt. Polson, c Pratt, b King	...	28	" Lindsay, not out	...	6
Sergt.-Major Spence, c and b Wheble	...	0	" Pratt	} Did not bat.	
Qr.-Mr.-Sergt. Rorke, b Wheble	...	0	Mr. MacMahon		
Bombr. Seville, not out	...	0	Capt. Simpson		
" Lindley, c de Robeck, b Wheble	...	1	" de Robeck		
Byes, 12; leg byes, 7; wide, 1	...	20	Byes, 2; leg byes, 3	...	5
Total	...	275	Total	...	98

ROYAL ARTILLERY & ROYAL MILITARY ACADEMY.

4TH AND 5TH JUNE.

ROYAL MILITARY ACADEMY.

1st Innings.

Mr. W. Strong, b Key	19
Mr. E. J. Peel, c Curteis, b Anstruther	0
Mr. H. M. Barnes, b Anstruther	6
Mr. F. A. Wynter, c Key, b Anstruther	0
Mr. J. Bellhouse, st Curteis, b Anstruther	55
Mr. J. Kendall, c sub., b Anstruther	8
Mr. C. A. Sykes, lbw. Anstruther	3
Mr. J. Horne, b Anstruther	0
Mr. F. H. Sheppard, c and b Anstruther	0
Mr. W. Bignell, lbw., Pratt	44
Mr. W. V. Elwes, not out	44
Byes, 11; leg byes, 6	17
Total	196

2nd Innings.

b Key	50
c Curteis, b Anstruther	0
st Curteis, b Anstruther	17
b Key	1
b Anstruther	0
b Key	21
c Curteis, b Key	6
lbw., Pratt	21
not out	5
c and b Anstruther	3
b Key	22
Byes, 10; leg byes, 3; wide, 1	14
Total	180

ROYAL ARTILLERY.

Lt.-Col. Hutchinson, c Strong, b Sheppard	63	not out	100
Major Anstruther, c Sheppard, b Elwes	18	c and b Bignell	6
Capt. Wheble, c Kendall, b Bignell	0	c Wynter, b Barnes	45
" Curteis, b Elwes	5	b Elwes	25
Mr. Chamier, b Bignell	2	lbw., Bignell	1
Capt. Pratt, c Barnes, b Sheppard	12	not out	0
Mr. C. C. Key, c Bignell, b Bellhouse	1	} Did not bat.	
Capt. Heyman, b Sheppard	8		
Mr. MacMahon, run out	26		
Capt. Simpson, c Peel, b Elwes	12		
" Gordon, not out	4		
Byes, 11; leg byes, 9; no ball, 1	21	Byes, 5; leg byes, 2; wide, 2; no ball, 1	10
Total	172	Total	187

ROYAL ARTILLERY, WOOLWICH, & ROYAL NAVAL COLLEGE.

RECTORY FIELD, CHARLTON, 6TH JUNE.

ROYAL ARTILLERY.

Capt. Hall, b Harris	26
Mr. J. Haggard, b Farquhar	19
Bombr. Barton, c Glead, b Farquhar	24
Capt. Curteis, st Pipon, b Farquhar	63
Mr. Dale, c Christian, b Harris	5
Capt. Pratt, b Harris	19
" Heyman, retired hurt	6
" Gordon, b Harris	17
Mr. T. L. Coxhead, b Osborne	10
Mr. H. L. A. Jenkinson, b Farquhar	9
Capt. Lindsay, not out	0
Byes, 17; leg byes, 5; wide, 2	24
Total	222

ROYAL NAVAL COLLEGE.

Lieut. Henderson, b Pratt	10
" Farquhar, c Gordon, b Pratt	8
Mr. Davidson, b Pratt	1
Mr. D'Oyly, c Barton, b Coxhead	1
Lieut. Christian, b Curteis	22
Capt. Osborne, c Dale, b Coxhead	20
Mr. Cave, b Coxhead	16
Capt. Pipon, c and b Coxhead	0
Mr. Harris, c and b Curteis	1
Mr. Glead, c Coxhead, b Curteis	0
Mr. Gwyn, not out	0
Wide, 2	2
Total	81

ROYAL ARTILLERY, WOOLWICH, v BLACKHEATH, C.C.

RECTORY FIELD, CHARLTON, 9TH JUNE.

ROYAL ARTILLERY.

Major Anstruther, c Ireland, b S. Christopherson	...	...	36
Sergt.-Major Hunter, c Ireland, b S. Christopherson	...	...	16
Mr. J. Haggard, b Daffen	...	...	0
Capt. Wheble, b S. Christopherson	...	...	0
" Curteis, run out	...	...	54
" Hall, c K. Christopherse b S. Christopherson	...	...	11
Mr. C. D. King, c Ormerod, b Daffen	...	...	6
Mr. MacMahon, st Monkland, b Harris	...	...	28
Capt. de Robeck, b Daffen	...	...	10
" Plant, not out	...	...	0
Mr. Wray, b Daffen	...	...	0
Byes; 14; leg byes, 3	...	...	17
Total	...	...	178

BLACKHEATH.

Lord Harris, c Curteis, b Haggard	...	...	92
Mr. Stanley Christopherson, b King	...	...	21
Mr. A. Daffen, c Hunter, b de Robeck	...	...	76
Mr. F. H. Lacey, c de Robeck, b Wheble	...	...	19
Mr. R. S. Barrow, not out	...	...	30
Mr. H. C. Blaker, not out	...	...	14
Mr. F. G. Monkland,	} Did not bat.		
Mr. K. Christopherson,			
Mr. M. J. Druitt,			
Mr. E. B. Ormerod,			
Mr. F. S. Ireland,			
Byes, 6; leg byes, 4; wides, 7	...	...	17
Total	...	...	269

ROYAL ARTILLERY, WOOLWICH, v ROYAL NAVAL COLLEGE.

WOOLWICH, 16TH JUNE.

ROYAL NAVAL COLLEGE.

1st Innings.			2nd Innings.		
Lieut. S. Farquhar, b King	...	6	not out	...	26
" F. B. Henderson, b Coxhead	...	0			
Mr. A. P. Davidson, b King	...	0	not out	...	12
Capt. Pipon, c Curteis, b Coxhead	...	0	b Calley	...	8
Lieut. A. H. Christian, b King	...	37	b Anstruther	...	9
Mr. F. G. Bird, c MacMahon, b King	...	9			
Major Leefe, c King, b Coxhead	...	0			
Mr. G. N. A. Harris, c and b King	...	4			
Mr. R. W. Glennie, c and b Coxhead	...	0			
Rev. — Francis, not out	...	5	b Anstruther	...	9
Mr. R. W. O. Johnson, run out	...	3			
Byes, 4; leg byes, 2	...	6	Byes, 1; leg byes, 1; wide, 2	...	4
Total	...	70	Total	...	68

ROYAL ARTILLERY.

Major Anstruther, b Harris	...	...	69
" Stephenson, b Harris	...	...	2
Mr. C. D. King, c Henderson, b Harris	...	...	34
Capt. Curteis, b Harris	...	...	4
Mr. MacMahon, lbw., b Farquhar	...	...	15
Capt. Simpson, c Farquhar, b Harris	...	...	9
Mr. Calley, b Harris	...	...	8
Mr. Coxhead, b Henderson	...	...	5
Mr. Jenkinson, b Harris	...	...	40
Hon. Mr. Selater Booth, c Pipon, b Farquhar	...	...	24
Mr. Powell, not out	...	...	4
Byes, 5; leg byes, 1; Wide, 1	...	...	7
Total	...	...	221

OUR AMMUNITION COLUMNS.

(REPRINTED BY PERMISSION FROM ROYAL UNITED SERVICE INSTITUTION JOURNAL).

BY

CAPTAIN G. HARRIS, QUARTER-MASTER, ORDNANCE STORE
DEPARTMENT.

It is understood that a real and solid effort is now being made to put two Army Corps into a fit condition to take the field. All the fighting parts of the force are forthcoming, and the necessary reserves for them duly appointed, it is presumed.

The Commissariat and Transport Service has doubled its cadres, and a heavy expenditure of money in horseflesh would no doubt put it on a war footing speedily.

The Medical Department and its rather numerous wants appear to be provided for in a general way.

The principle in each of the foregoing branches is to expand itself to meet the necessary requirements in time of war, and for which all the years of peace are quietly devoted.

The Staff of the Ordnance Store Department—the most important branch of all the supply departments, *i.e.*, the one charged with the duty of providing, receiving, holding, issuing, and accounting for all munitions of war and equipment—makes no visible preparation, but seems to be compelled by circumstances uncontrollable by it, to sit still and allow its uncompleted functions to be arranged for and carried out by other branches of the Service, more particularly so when it becomes necessary to arrange for the provision of Ammunition Columns for an army in the field.

The formation of these columns seems to be treated in quite an exceptional manner, consequent, it is assumed, on the necessity that they should be disciplined and able to keep up with the bodies of troops to which they would be attached.

The present method is as follows:—

On the Army Corps being mobilized, a sufficient number of batteries of Field Artillery would be broken up and converted into ammunition columns.

To one unacquainted with military matters, and to the heavy calls which are made on the reserves of an army (even though the fighting may not be heavy), the above plan would seem to be perfect; at once you have the officers, men, and horses, and, on the equipment, &c., being supplied, they would be ready to take the field without delay.

But can we really afford to break up this splendid fighting force to carry out supply work? Let us see what would actually occur on a mobilization being ordered.

Picture to yourself the striving, by all influence possible, of the various battery commanders to avoid having their batteries selected for breaking up, and how strenuous would be the efforts to leave the columns thus formed in order to get into the Service batteries.

Many of the best officers would be successful in their efforts, and one can well understand that numbers of the best non-commissioned officers and men, and also (a most important item) many of the most serviceable horses would be found transferred to the Service batteries.

These skeletons of their former selves would then be filled up with men from the reserves, and with fresh officers, non-commissioned officers, and men from other batteries similarly treated; thus, with strange equipment and horses, and with all the well-understood absence of pull "together," the columns would be expected to stand the strain of embarkation, a sea journey, a landing, and probable immediate service in the field, and in a strange climate.

Only those who know the anxiety which falls upon the commander of a battery in the field when about to land with his complicated equipment, can judge thoroughly of the predicament the Ammunition Column Commander would be in at such a time, with his long train of 51 vehicles and 257 horses, which latter fact alone might necessitate his command being spread over two transports.

Moreover, first consider that for years you educate officers and men to certain work, and they become proficient in and proud of their duties—they are attached to their guns, and take a soldier's pleasure in their horses and their battery.

Suddenly the war clouds loom low, and you disintegrate battery after battery, take away their guns, issue out to them wagons, &c., and convert a fighting machine into what officers and men will think (although as good soldiers they will not say), viz., that they are now mere hewers of wood and drawers of water for their brethren in the fighting line. Imagine, say the Buffs, on the eve of a war, being told off as ammunition carriers for the other Arms, and you can guess that cheerfulness would not reign supreme in the camp of that regiment. Sooner than not proceed on field service, we know that officers and men will gladly go in any capacity almost, and good soldiers will always do as they are ordered; consequently any objection, it might be urged, to being in a battery converted into ammunition columns, is merely one of sentiment.

Well, good soldiers do as they are ordered; but if it can be pointed out how breaking up the battery can be avoided, and that to do so for the purpose of providing ammunition columns is a great waste of fighting material (which might at any later period be urgently required), then it is hoped that attention will be secured, for practical and not sentimental reasons in these proposals, and that it will be admitted that an effort is made to show how to provide equally mobile and more suitable columns without depriving the Royal Artillery of a single gun, or effective officer, man, or horse, each and all

of whom would be required for its own legitimate field of action in the case of this country becoming involved in what we might call a "Two Army Corps War;" and in addition the nation would press for the formation at home of a third corps, or the visible materials for its composition, especially in the case of a check at the commencement of operations.

Prior to pointing out how the new columns may be provided, let us see what is the authorized strength of the several columns for two Army Corps.

A Divisional Column consists of:—

- 4 officers,
- 35 non-com. officers, artificers, &c.,
- 50 gunners,
- 123 drivers,
- 15 vehicles special to R.A., such as gun-carriages, &c.,
- 36 do. general to the Army,
- 21 riding horses,
- 236 draught do.

(Medical officer and veterinary surgeon and their horses not included).

There are three such Divisional Reserves for each Army Corps, and for the two Army Corps we must multiply the foregoing by six; this gives us—

- 24 officers,
- 210 non-com. officers, artificers, &c.,
- 300 gunners,
- 738 drivers,
- 90 vehicles special to R.A.,
- 216 do. general to the Army.
- 126 riding horses.
- 1,416 draught do.

We now pass to the Army Corps Reserves.

The strength of one section is given as follows:—

- 4 officers,
- 35 non-com. officers, artificers, &c.,
- 50 gunners,
- 80 drivers,
- 3 vehicles special to R.A.,
- 30 do. general to the Army,
- 21 riding horses,
- 148 draught do.

To two Army Corps there would be six sections, three to each; this would come to—

- 24 officers,
- 210 non-com. officers, artificers, &c.,
- 300 gunners,
- 480 drivers,
- 18 vehicles special to R.A.,
- 180 do. general to the Army,
- 126 riding horses,
- 900 draught do.

The grand total to be provided by the Royal Artillery for this supply work from broken up batteries, &c., being—

48 officers,
420 non-com. officers, artificers, &c.,
600 gunners,
1,218 drivers,
108 vehicles special to R.A.,
396 do. general to the Army,
252 riding horses,
2,316 draught do.

It will be seen that the total to be met is “a pretty tall one,” to use an American phrase, but let us take it for granted that the officers, vehicles (a store supply matter), and riding horses will be readily forthcoming, and set ourselves to the task of ascertaining from whence the—

1,020 non-com. officers, gunners, artificers, &c.,
1,218 drivers,
2,316 draught horses,

are to be procured.

Let any Royal Artillery officer ask himself from whence he is going to produce this requirement for supply purposes alone, and how many guns of the batteries outside those selected for the two Army Corps, will have to go into store to enable the regiment to meet such a call; even if he makes a liberal allowance for the men coming up from the Reserves, as far as drivers are concerned.

As a first step, it will be necessary to show the number of batteries of Horse and Field Artillery available, outside the Service batteries for the two Army Corps, and also their strength in non-commissioned officers, gunners, drivers, and draught horses.

On reference to the current Army List it will be seen that there are at home—

10 Service Horse Batteries,
39 do. Field do.

The two Army Corps would appropriate of these—

6 Horse Batteries,
24 Field do.

leaving 4 Horse and 15 Field Batteries, to provide the drivers, draught horses, &c., for the Ammunition Columns.

Putting aside the 4-Horse Batteries, we find that in the remaining Field Batteries the following strength per battery :—

79 non-com. officers, gunners, &c.,
55 drivers,
46 draught horses.

This for the 15 batteries would give an available total of—

1,185 non-com. officers, gunners, &c.,
825 drivers.
690 draught horses.

It will be seen that this would not meet the case as far as the drivers

and draught horses are concerned, *and that it would wipe out our remaining Field Artillery entirely.*

However, it is believed that if even it appropriated but one-half of the available force, public opinion and the best interests of the country would declare decidedly against the breaking up of this fighting force for purely supply purposes, and the apathy with which such intentions are now received will be no criterion of the storm of protest which would be raised with a big war imminent.

Such a result, leaving but a few batteries of Horse and Field Artillery in England to meet casualties (heavy or light) in the field, would not be tolerated now that the nation takes an intelligent interest in such matters, and at the last moment, and at a very heavy cost, other means than those contemplated would have to be improvised.

Of course it may be said, "But batteries would be brought from India?" To such it may be answered, that no man who looks ahead can count upon that for a certainty, and he who counts upon success, counts upon certainties only. War is a game of chance more or less, but sensible nations leave as little as possible to chance.

Finally, no great assistance towards Ammunition Columns could be looked for from the Garrison Artillery, when it is considered what heavy calls would be made upon this branch of the Royal Artillery for garrisoning our enormous foreign fortresses, coaling stations, siege-train requirements, &c., not to speak of the home ports.

In addition, is there not something passing strange in the proposed arrangements to provide ammunition columns for the supply of the Army from the Royal Artillery?

You have one branch of the Army which provides the soldier with all descriptions of food, and which hands it to him wherever he may be; another branch is charged with care for his health, and attends to him wherever he is, in or out of the fighting line; a third branch of the supply services is trusted to provide shot and shell and other ammunition, &c., of all kinds for army use, to convey it across sea and land it, forward it to the advanced depôt, and then all further trust in the capabilities of the officers of the department seems to collapse, as far as the supply of ammunition is concerned. It may send its officers and conductors forward of the depôt with unlimited arms and equipment if necessary, but not a single round of ammunition. Up to the advanced depôt we behave as a practical nation; beyond that our system becomes "mixed," and the chain of responsibility broken.

The branch to which reference is made is that known as the "Ordnance Store Department," or which might be more properly designated as the "Ordnance Staff."

The officers of this department and the corps represent at present a compact body of—

104 officers (readily increased),
80 conductors (readily increased),
680 non-com. officers and men,

with probably a reserve of 300 non-commissioned officers and men, making a total of nearly 1,200 officers and men inured to all the com-

plicated work of supply, and they are trusted to provide any one of the ten thousand other items to the troops in the fighting line such as I have already mentioned, but not a single round of ammunition beyond the advanced dépôt; consequently, at a most critical point, there comes a break in the chain of supply, another branch of the Service steps in, and all the cumbrous machinery of handing over and receiving, passing vouchers, &c., commences, an entire and quite unnecessary change of responsibility takes place, and, to add to the strangeness of the proceeding, you break up numerous fighting batteries to carry this out.

The proposed columns would always find room on board one ship, and there would be no divided charge, and, in most instances, two columns could be accommodated in one vessel. The officers and men would be simply carrying out the work which fell to them during times of peace, and which they naturally consider their own in time of war. The transfer of these duties in war-time to another branch leads to uncomfortable inferences. Remember also that there will be an ever-present danger that when great losses come upon the service batteries (and come they will), there will be an irresistible desire on the part of the commanders of Artillery, to close upon men and horses from the Ammunition Columns to make good the losses in the batteries.

If these columns belonged to a distinct and separate corps this expedient would not even suggest itself, and some better method than that at present existing would be an absolute necessity, to enable the service batteries to recoup their losses in the field.

Let the commanders of Artillery not forget that on the day that they meet the Artillery of an European army, they must be prepared to give and get such a pounding as all our former Artillery contests can furnish but a poor idea of, and that they will be fortunate to be on the winning side if even with heavy losses.

Our Artillery is as fine a force as can be produced on the Continent, and unsurpassed in discipline and efficiency; but it must not be forgotten that, according to the old adage, "accidents occasionally happen in the best regulated families," and it well becomes the authorities as able children of men, and wise in their own generation, to consider further any alternative scheme prior to breaking up a single fighting battery for purely supply work.

If ever we become involved in this "Two Army Corps War," we may depend upon it that every effective man and gun will be required sooner or later; and whether we be fortunate to be on the winning side, and gain instead of losing ground, the officers commanding the Artillery will be sufficiently employed in their own special province, without being called upon to superintend supply services.

The Adjutant-General of an army in the field and his deputies who are charged by the regulations with the disposition of all these supplies of ammunition, can surely carry out their duties without straining the resources of the Artillery.

The Adjutant-General's department is a numerous one in the field—its staff command at the front—on the lines of communication, and at the reserves, and this splendid body of officers should experience no difficulty in seeing that the Ordnance Department had every round of ammunition on the correct spot.

No new posts or appointments would be necessary in the proposed arrangements. Possessing as we do this large Ordnance Staff of officers, non-commissioned officers, and men, disciplined and well acquainted with war material of all descriptions, let me ask where you can get a better or more suitable establishment for the work—serving as they do in all parts of the globe—constantly engaged in all the intricacies of supply duties, contriving in all our small wars to get on without any specially constituted Ammunition Columns other than its own, and keeping the army well supplied with ammunition and stores; why seek for an organization outside it?

This corps of officers and men is a splendid nucleus for Ammunition Columns up to any strength, and no objection can be urged that it is unsuited to assume supply duties in the field as regards ammunition on the score of want of knowledge or ability.

Increased facilities and an extended organization are given to the Transport branch to bring it up to its war requirements. Permission is given to the Medical Staff to search the ranks of the Militia and Volunteers for aid to bring that department up to its war strength.

Why not give this large staff of the Ordnance Store Department similar facilities, put it upon its metal, look to it to point the way for due provision being made for the supply of ammunition (as well as other stores) to the fighting line, and not stopped short at the advanced depôts?

Why break up a single battery if it can be avoided?

Why employ a single effective fighter unnecessarily in the work of supply?

Why not provide the necessary horse-flesh for this duty quietly in time of peace, and almost inexpensively if the proposals to be given hereafter be followed, and thus be clear of the high prices for inferior horses which would prevail when war became imminent?

An effort to answer these problems is considered quite sufficient justification for this paper, and we will address ourselves to an endeavour to solve them.

Of the 980 non-commissioned officers and men with the colours, and in the reserve belonging to the Ordnance Corps, 100 would be employed on various Colonial stations; 250 would be necessary for the ordinary work of the department in the field. This would leave upwards of 600 non-commissioned officers and men, which would be ample for the proposed columns for duty as issuers, &c. (*i.e.*, the same duties as would be performed by the non-commissioned officers and gunners now employed with the columns). They would be men able to read and write, and be thoroughly instructed and understand the main principles of supply work.

The duties at home of officers proceeding on field service could be done by officers on the Retired List, and that of the non-commissioned officers and men by pensioners.

It has now been shown how the officers to command, the subordinates to issue out, load up, unload and guard the columns, would be provided.

We will now pass to the present and proposed vehicles, leaving the most important items, the large staff of drivers and draught horses, to the last.

The vehicles at present laid down for the Ammunition Columns of two Army Corps are as follows, viz. :—

- 12 16-pr. spare gun carriages and their limbers (packed), each drawn by four horses with two drivers.
- 12 9-pr. do. do.
- 36 16-pr. ammunition wagons with limbers (packed), and drawn each by six horses with three drivers.
- 36 9-pr. do. do.
- 12 Forge limber wagons with limbers, each drawn by four horses with two drivers.

(The foregoing are special to the Artillery).

- 144 S.A.A. carts drawn by two horses each, with one driver.
- 216 General service ammunition and store wagons drawn by six horses each, with three drivers.
- 24 Do. do. drawn by four horses each, with two drivers.
- 36 Do. do. for stores, baggage, rockets, and spare purposes, drawn by six and four horses each as required, with a corresponding number of drivers.

(These carts and wagons are more or less general to the Army).

In the proposed organization it is suggested that the

- 12 16-pr. spare gun carriages,
- 12 9-pr. do. do.
- 36 16-pr. do. ammunition wagons.
- 36 9-pr. do. do.
- 12 Forge (limber up) wagons (these latter might be reduced to six).

be removed from the Ammunition Columns and accompany the Corps Artillery as an Artillery Reserve for carriages, drivers, horses, &c., and thus enable the guns to rapidly replace losses without interfering with the regular work of supply.

If this were not found convenient or suitable at all times, they could be attached to the Ammunition Columns (under a Royal Artillery officer), and would be expended under the order of the officer commanding Royal Artillery as above indicated.

It now remains to provide for the conveyance of the—

- 144 S.A.A. carts,
- 84 G.S. wagons, drawn by six horses.
- 168 do. do. four do.

S.A.A. Cart.—This cart is drawn by two horses (the driver riding one); the cart's construction, and also the draught is considered open to great improvement.

The S.A. ammunition itself is first packed in packages of ten rounds in brown paper, about sixty of these are placed in a tin-lined (hermetically-sealed) box made of strong mahogany or deal nearly an inch thick, and finally bound with copper straps—strong and sure enough in all reason to stand years of knocking about on field service—one would think that if the boxes were covered with a tarpaulin or greased

sail cover, and packed neatly in an open cart which could be used for other purposes at some other stage of its existence, all that was required had been met, considering that the danger of explosion is practically "nil."

This cart is provided with a number of wooden compartments, with a sloping roof, and closed up at the back; it will carry a certain number of boxes and no more, however great the necessity, and the graceful slope of the roof prevents one even placing a ration of forage or a wounded man on at it a pinch.

Again, ten chances to one if after the issue of a box of ammunition is made, all balance on the part of the cart is destroyed, and cannot be readily perceived and re-arranged.

An open cart with sides would enable a greater quantity of ammunition to be conveyed, and the driver could sit on the front of the cart—the necessity of having drivers able to ride would be avoided—a horse of from five to ten years old would readily draw this, from 20 to 25 miles a day, taking roads as you find them; would also be able to move considerable distances at a trot, and would get the load across country in a way that would put the present driver (with his two service horses) to the blush.

A sail cloth to cover the ammunition, and when halted, sufficiently large to come over the sides and ends and reach the ground, would provide sleeping accommodation for the driver and issuer attached to it, and also cover for the harness in inclement weather.

No tents would be necessary for these men.

A cart of this description could be used for other purposes in military life, would be useful in civil life, and on the conclusion of a war would be worth transit home for sale; lastly, instead of 144 carts 132 would be found sufficient.

Each cart could carry a small supply of entrenching tools, and would never have any difficulty in keeping up with troops, thus saving the soldier's spinal column, which inventors of entrenching tools, &c., seem to be under the impression was specially fitted up as a peg for hanging their inventions upon.

Ammunition or Store Wagons, General Service, &c.

With regard to this wagon and its stiff tall sides and low canvas roof supported by bale hoops, whoever saw a G.S. wagon survive the ordeal of shipping and unshipping, and be found with bale hoops and their staples safe and sound and the canvas cover untrampled?

Then, again, the struggle to get at boxes in the underneath layer in the centre, for instance, and the delay to arrive at a fair idea of the wagon's contents, moreover, everything must be loaded and unloaded at the rear end of the wagon, for if the cover did not prevent it the sides would not long stand the heavy pounding of boxes being roughly placed on them, and the height to lift the box is great.

If it were necessary for the columns to pass through streets or villages in a state of conflagration, the present canvas covers would seem to be the readiest way to court the danger they are intended to

shun. Why not clear away the bale hoops and have only a greased sail cover (which could be readily saturated on the upper side with water on an emergency).

Gun cartridges and shell can now be so securely packed in their respective metal-lined cases and boxes that very little additional precaution is necessary, and in fact the ability to readily throw off a sail cover and inspect the contents of each wagon is a desideratum not to be over-estimated. The cover could be thrown over the wagon at night, the ends falling to the ground, and underneath the wagon would be plenty of space for drivers and issuers attached to it to sleep. Tents would again be unnecessary, and during inclement weather the wagon and its cover is infinitely superior to a tent. This wagon is at present drawn by six horses with three drivers, a great waste of material and power, it weighs $19\frac{1}{2}$ cwt. and its load is about 30 cwt.

It is suggested that after the present stock is used up, these wagons be constructed to approach more closely to the wagons carrying similar weights used by the great carrying companies and corporations (the wheels and axletrees could remain interchangeable, the body and pole or shafts only requiring alteration). It could be driven from a box seat and drawn by two horses of a stronger build than the present Royal Artillery draught horse, say from five to ten or twelve years old. There would again be no necessity for rejecting a competent driver because he could not ride. The ordinary army ration of forage would be quite enough for these horses, and the class of driver proposed might be depended upon to see that none was wasted.

With reference to the stowage of the ammunition it is as well to point out the present great waste of space, and the enormous amount of additional material unnecessarily carried.

Take a box of 16-pr. common or shrapnel shell—these are studded projectiles—and on opening the box it will be found that each shell is carefully kept from touching its fellow, the idea being to keep the soft metal studs from injury. If a trial be made it will be found that there is no difficulty in placing eight shells in this box instead of six, and yet carefully protect the studs, and in addition the size of the box can then be reduced.

The same remarks apply to the boxes containing 9-pr. ammunition, where a saving of stowage of about 30 per cent. could be made.

With regard to the studless 13-pr. projectiles, which require protection in travelling for the copper gas-check only, it will be found that a saving of space on the present packing of nearly 50 per cent. can be made. These are considerations of transcendent importance.

G.S. wagons for use as forge wagons can be fitted up with the useful and efficient forge and set of tools now carried by the "forge limber-up wagon," and could be horsed and driven as the other wagons. One forge wagon would accompany each column, and would be available for the service generally of the army; it would also be able to convey a good supply of horse-shoes of a pattern suitable to these horses. Breaks should be fitted to the rear of each of these wagons; this could be attended to by the man acting as issuer, and if in future

patterns the wagons could be assimilated to those in use in mercantile life they would be worth transit home, and would sell readily if necessary.

These remarks apply with equal force to all the wagons in use in the Transport service.

Drivers and Horses.

We now pass to the provision of the drivers, horses, harness (and vehicles when the present stock is exhausted).

In the columns proposed, 480 drivers would only be required instead of 1,218, and as the men will not need to be able to ride, you may count as on a certainty, that larger numbers of suitable men from which to pick, will be available.

In this country we have in all our large and small towns corporations whose show of horse flesh and capable drivers is something unique, and they are now-a-days closely followed in this respect by the various agencies of the large carrying companies and contractors for great engineering works, &c., &c. The horses are always kept in splendid condition, and the stables and interior economy of these establishments of horses and wagons, are surprisingly good. The result of enquiries assures me that if these corporations, &c., be approached in a proper sense, both from a patriotic and also a business point of view, a ready response to a Government Circular (as below) would be the result.

Circular.

To the Corporation of

Your total number of horses, wagons, carts, and drivers at present in employment is—

60 drivers,
80 horses,
40 carts,
30 wagons,

would you be prepared to provide in case of war, and during peace time for twenty-one days annually (for manœuvres)—

6 drivers,
10 horses with harness,
2 carts,
4 wagons,

On the conditions following :—

The drivers to be *bonâ fide* Army Reserve men in your employ and recommended by you, and for each man so entering the Army Reserve up to the above number, your corporation to receive £2.

The Government to pay you £5 per annum for each of the above horses held ready for Government use as above stated.

Half the price of the harness which would be in good order on the horses being called up.

Half the price of each wagon or cart if they be of the authorised pattern.

All the foregoing to be passed by a Government Officer.

The wagon to be guaranteed by the Corporation for eight years and the cart for ten years.

Casualties in war time to be replaced at the Government expense.

Re-employment for the drivers to be guaranteed by the corporation on the termination of the war, provided the drivers return with good characters.

The men would be retained with their own horses as long as the exigences of field service would permit.

The following reasons would stimulate the several corporations to view these proposals favourably :—

1. The small call made upon each corporation would not cause it inconvenience to replace.

2. The patriotism of each individual member and his constituents would be brought into play.

3. The fact that this method would solve an otherwise expensive problem and ease the taxpayer.

4. In time of peace the use of the wagons, &c., for twenty-one days or less would be unfelt.

5. That a payment in part was being made would also soothe the business keenness of the several towns, &c.

6. The certainty that a good many years would intervene between our "Two Army Corps wars," and thus casualties on field service would be the exception rather than the rule.

A prior warning would (if possible) be always given to enable the horses to be hardened by outside stabling, &c.

The proposed details are given on page 373.

It will now be seen that instead of taking away from the Royal Artillery,

420 non-com. officers,
600 gunners,

we should have the work of issuing, &c., done by the present Ordnance Store Corps and its reserve (their duties at home being performed by pensioners), and instead of depriving the Royal Artillery of—

1,218 drivers,
2,316 draught horses,

we should have this supply work done by

480 drivers,
684 draught horses.

The difference in the lengths of each of all the columns, and the lesser number of mouths to be fed is an important consideration.

The proposed method of driving is practically what the Transport Department of the Army will have to come to, fight they ever so much to retain the imitation of Artillery gun teams.

In addition this change in driving and the consequent less exhaus-

tion of the horses, the clearing away of all unnecessary top hamper, reduction in the number of shell boxes consequent on the change in their packing, the provision of heavier and stronger horses all inured to draught, would enable the numbers of wagons and carts to be reduced as under, viz., instead of—

84 wagons drawn by 6 horses, with 3 drivers,
 168 do. do. 4 do. 2 do.
 144 carts do. 2 do. 1 do.

we should have—

252 wagons drawn by 2 horses, with 1 driver,
 132 carts do. 1 do. 1 do.

a difference of—

12 wagons utilized as forges,
 12 carts dispensed with altogether.

	With 1 column.	With 12 columns.	Remarks.
<i>Officers.</i>			
Major (or A.C. General)	always with column in front	6	Administrative.
Captains (or D.A.C. General)	1	12	In command.
Lieutenant (Quartermaster)	1	12	Assisting do., and as accountant for ammunition.
<i>Warrant Officers.</i>			
Conductors of stores	2	24	1 for discipline, 1 for office work, pay, clothing, &c.
<i>Non-com. Officers and Men.</i>			
Staff sergeants or sergeants	4	48	
Rank and file, non-com. officers	8	96	
Privates as issuers, clerks, and servants	40	480	
Drivers (and as grooms)	40	480	
Buglers	2	24	
<i>Artificers.</i>			
Sergeant farrier	1	12	Large numbers of the men of the O.S. Corps are tradesmen, and would be also available.
Shoeing smiths	3	36	
Carriage smiths	1	12	
Fitters	1	12	
Collar makers	2	24	
Wheelers	1	12	
<i>Vehicles.</i>			
S.A.A. carts	11	132	
Ammunition and store wagons	20	240	
Do. as a forge wagon	1	12	
<i>Horses.</i>			
Riding horses for officers, warrant officers, sergeants, buglers, half the rank and file, non-com. officers, artificers, and 2 spare	20	240	
<i>Draught Horses.</i>			
1 per cart, 11 } 2 " wagon, 42 } 4 spare 4 }	57	684	

Each wagon would when packed weigh 55 cwt. (*i.e.*, $19\frac{1}{2}$ cwt. for wagon, $35\frac{1}{2}$ cwt. for load), not too great a load for two powerful horses, and some cwt. less than they would always draw under their civil masters, taking roads as they found them, good and bad.

There would thus be a total of twelve columns, three columns in front and three in reserve with each Army Corps; and it is claimed for this similarity in strength, composition, and ammunition carried, that should it be necessary for the General Commanding-in-Chief to order any of the columns from one division to pass over to the aid of other divisions to replenish expended ammunition, the Adjutant-General's Department would know what to arrange for at once, but, if any such necessity arose, the transfer of the whole or a portion of the Divisional Column would bring with it confusion, for the Corps Reserve section could not replace it suitably, being composed of all wagons and but two carts.

The columns as proposed would be interchangeable throughout, and advantage could be taken of this whenever it would save a day's march on the part of any of the columns—thus for instance an army in position might have fought on its right flank and expended ammunition—two of its columns might have to march to the rear to replenish, these might move to roads on the unexposed flank, and intact Reserve Columns brought over from the corps on the unthreatened flank—the columns would thus carry out their duty with less confusion and risk, and on return would move into their new position as reserves for the divisions on the less exposed flank, and the Adjutant-General would know exactly how he stood—the knowledge that it was necessary for two columns to march to the rear to replenish, would give him an idea clearer than scores of returns of expenditure.

There being no difference between the Divisional and Army Corps columns, the forward column would always be the Divisional Column, and the rearward one that known as the Army Corps Reserve.

The twelve columns would start at first with the same quantities of S.A. and gun ammunition as those now authorised, and each column would, as its turn came, be able to deliver direct to the troops in the fighting line, without the additional cumbrous method involved under the present organization, which would seem to arrange for the actual transfer on the field of the contents of each section to the Divisional Reserve, and all the necessary formulæ of vouchers, &c., which would again occur, on the divisional reserve passing the ammunition to the troops engaged.

There could always be the same number of ammunition carts forward as there now are, if it were considered expedient, in order to facilitate a quick supply across a broken country for instance; and as the expenditure went on, a column emptied of its contents, either to the troops, or to a fellow column of its unexpended loads, could at once commence its march to the rear intact and complete, thus avoiding the first elements of confusion always caused by splitting up troops.

There would never be the risk of any wagons at the front remaining empty until supplied by other wagons as at present, and the columns marching to the rear early in the day, could rapidly clear the field

hospitals of cases fit to travel by their wagons, and who could be put into them rapidly, in order that the rearward march of the column would not be impeded.

The composition of the columns as proposed would enable them to empty their loads and gain a march to the rear of quite half a day and similarly with the next column emptied, this of course meaning that they would be back again so much the sooner. A gain of hours means something in these matters.

The division of the columns into twelve units will ensure the greatest quantity of ammunition being at the front, and if the expenditure should become heavy, the greatest number of vehicles would be on the road for further supplies, a consideration not to be discarded with the advent of a quicker firing rifle than the Martini-Henry.

The Divisional Commander would consider the column nearest to him and marching on his line as the Divisional Reserve and the column next behind that, although nominally for the Army Corps, would be as at present his further reserve.

These arrangements would be thoroughly understood and would ensure a fair share of hard work, hard marching, and conjoint responsibility for a perpetual supply on the part of the columns throughout.

Our present system seems to arrange for the supply to the troops being done by one half, and the marching to and from the advanced depot by the other half,—hardly a fair division of labour.

Under the present arrangements large numbers of horses would have to be provided suddenly and they would not stand the noise of the heavy firing. Under the proposed arrangements we should know where our particular horses were, and each horse could be treated to the expenditure of a couple of boxes of "doubtful ammunition" weekly, for an indefinite period, to accustom them to the din infernal, without trenching very heavily on our stock of that commodity.

The responsibility having clearly been placed on the Ordnance Store Department, it may safely be reckoned upon, now that the staff of the department has a large and intelligent corps of its own, to speedily supplement the supply line by all available local means, accustomed as the officers are to serve in all quarters of the globe (except India), instead of having to sit still with folded arms, impotent to carry on the work they feel to be theirs only.

In the columns proposed, all the elements of discipline, knowledge, and soldierly instincts would be combined. Nothing would be wanting to ensure the continuous supply and responsibility from Woolwich Arsenal to the base of operations, and from the base to the fighting line.

The saving in years to come, on the manufacture of wagons and carts, &c., and the provision of the large *personnel* of the present columns, would alone suffice as a reason for giving these proposals a trial.

The boon to a General and his Staff Officers in reducing the miles of supply columns is beyond calculation, putting aside the crowning fact, that if some suggestions similar to those embodied in this paper be not undertaken, we shall see with the embarkation of two Army Corps the almost entire wiping out of the remaining Field Artillery.

No nation in its senses could permit such a proceeding, and neither can a practical people be expected to keep Ammunition Columns eating their heads off in time of peace; but if a *modus vivendi* can be found to obviate a heavy peace expenditure, whilst still providing with certainty the necessary columns when war draws nigh, it would be simple self-destruction to neglect it.

Moreover, it is now very evident, that until the Ammunition Columns point the way to the system proposed of horsing, driving and construction of wagon, &c., we shall get no material changes in the present draught arrangements of our Army Transport.

The same persistent effort to follow the field guns in their methods (quite suitable for the guns) seems to go on as regards the transport service. Wagons with the least possible carrying capacity and the greatest expenditure of drivers and horseflesh, still form part of our Transport equipment, and are the greatest components of the baggage trains. All can be improved with a certainty of gain both to the country in efficiency and cost.

This paper is written without the slightest intention to deprecate any of the services referred to, but with a heart-felt wish to aid in their improvement. Practical experience has dictated many of the remarks.

The issues involved are important but simple.

Statement showing Cost of Proposals.

	£
For 684 horses at £5 per annum per horse	3,240
Honorarium to Corporations, &c., for 480 drivers, recommended by them at £2 per man every 6 or 8 years ...	960
For 252 wagons half cost every 8 years	} These charges would not fall due for years, there being a good stock in hand.
„ 132 carts do. do. 10 do.	
„ 684 single sets of harness every 6 years	
For Reserve pay of drivers. This would come from the ordinary Reserve pay vote.	

Charges during hostilities for home service:—

50 Retired officers at from 5s. to 10s. per diem in addition to their pension	} Daily £110
250 military or naval pensioners at 3s. 6d. per diem as clerks, and 400 at 2s. 6d. per diem as labourers	

The permanent charges to be considered are consequently that for horses, and for drivers' honorarium, viz., about £3,580 annually.

THE PNEUMATIC DYNAMITE CANNON.

COMMUNICATED BY

LIEUT. J. C. WRAY, R.H.A.

FROM the fact that the Pneumatic Dynamite Cannon has been called the "Zalinski Gun," considerable misconception appears to exist as to who was the inventor. Zalinski, who is a Lieutenant in the United States Artillery, had nothing to do with the invention of the gun, but being appointed to superintend the experiments, and becoming connected with the Company formed to bring the gun into use, his name has been attached to it in somewhat the same way as another name than that of Columbus has been attached to the native country of this gun.

All question as to the real inventor of the gun is set at rest by the annual report of the Secretary of War (Endicott) to the President of the United States, dated December 5, 1887: "The first of these guns was designed and constructed by Mr. Mefford, of Ohio, in 1883, and was brought to Fort Hamilton, New York, for trial, in January, 1884." Zalinski's name is not mentioned in the whole report.

This gun was invented by Mr. D. M. Mefford, of Toledo, Ohio, in the early spring of 1882, and was patented by him in the U.S., and elsewhere (English patent, No. 2,831, of 1883, June 7th). His first gun consisted of a small brass 2-inch tube, 30 feet long, weighing 145 lbs. It was mounted on a pivot post, set three feet in the ground. The breech was connected to the flask of boiler-iron filled with compressed air by a strong 2-inch fireman's hose eight feet long, one end of which was connected with the gun by a strong hose-coupling, capable of being detached for loading purposes. The rear end was secured to the flask by a coupling and stop-cock, the latter was worked by hand by means of a crank, fastened to the key of the stop-cock in discharging the gun. The idea of the flexible hose was to have the air passage through the hose straight with the bore of the gun, thereby avoiding any curves or angles calculated to demoralize the driving current of air and thereby weaken its force.

The gun, with some improvements suggested by experiments, was taken to Fort Hamilton on the east bank or shore of the narrows of the harbour of the City of New York, and was tried in January, 1884; and it was there and then that Zalinski first saw the gun and witnessed the experiments made with it, the result of which was that with 300 lbs. pressure, at half a mile range, its solid shot penetrated a hard

concrete target 26 inches, and with a compression of 452 lbs. it sent its solid projectiles one mile and a quarter, 7 feet deep into a hard clay hill. This performance greatly surprised all the officers who witnessed it, and has never since been approached, when considered in relation to the limited length of the gun and the low degree of the power employed. But the inventor discovered that although these wonderful results were obtained, yet the *flexible hose* was highly objectionable, for the reason that the least bend or curve in it, caused by traversing the gun, diminished the range of the projectile, and besides this, the hose was impossible in large calibered guns.

Mr. Mefford at once set about inventing plans to overcome this difficulty, but while he was so engaged patents were taken out founded on Mr. Mefford's principle, but without his concurrence, under circumstances which need not here be detailed. Upon these patents the Pneumatic Dynamite Gun Company of New York was based. The Company built an 8-inch gun, 60 feet long, and employed Lieut. Zalinski to superintend the experiments with it, although Zalinski never invented any part of it. The gun the Company built involved the principles of the Mefford invention, yet Mr. Mefford did not approve the alterations and modifications introduced by these patents, and in his opinion they were detrimental. The drawback of the so-called Zalinski gun is, that its maximum range, with as great a pressure as one thousand pounds to the square inch, is only one mile and three-quarters, whereas with the same pressure and elevation the range should be at least three miles. The cause of this difference in range is entirely owing to the channel of communication having two turns or corners, one at least rectangular between the gun and its flask of compressed air; and this no one acquainted with the laws governing the subject of the movement of air under high pressure could approve. All experiments in handling compressed air in high motion have proved beyond doubt that every turn in the channel that the air passes through demoralizes and greatly reduces its velocity, even if the angles to be passed are less than right angles: and even if there is a graduated curve, a whirling or cyclonic action is imposed on the current damaging its velocity. Hence Mr. Mefford's little gun with its straight-channelled connection exhibited a greater projectile power with less than one-half the pressure, and if it had been discharged in free open air would have surpassed the Company's best ranges with their 8-inch gun, 60 feet long. The vital weakness of a pneumatic gun, constructed on their principle, disqualifies it from ever becoming a naval arm, for its range falls far short of the range of the rifled cannon now in use by the Navies of the world, and a cruiser mounting pneumatic guns would inevitably be destroyed before she could get within striking distance. Then, again, a cruiser mounting pneumatic dynamite guns is in the highest degree vulnerable on account of the dynamite she has to carry, which explodes by concussion, and if the cruiser is struck by an enemy's rifled cannon shot the concussion would certainly explode the dynamite, blowing the cruiser and her men into atoms. The pneumatic gun of the Pneumatic Dynamite Company might perhaps in a masked battery be available for land

defences, where an entrance to a harbour is narrow, and well within range of the gun ; but it would never do to go to sea. Mr. Mefford has invented a pneumatic gun which he believes to embody all the features requisite to get the longest possible range obtainable by pneumatic power. It possesses two features that are all-important, to wit, straight channel and short channel ; and although this gun will almost or quite double the range of any gun constructed with an angular or curved channel, yet it may fall short of the range required to defend a cruiser upon which it is mounted, against the long-range rifle cannon of an enemy's ship, but it so far excels the Marine Torpedo that no nation can fail to appreciate its superiority over the latter, both in point of cost and practicability.

The following description of the latest Mefford Pneumatic Cannon will enable the reader to understand the many points of excellence possessed by it over anything of the kind ever invented.

Referring to the accompanying drawings, Fig. 1 represents a side elevation of Mr. Mefford's improved gun ; Fig. 2, a longitudinal vertical section of the same ; Fig. 3, a transverse section of the same on the line *xx*, showing in their preferred form the clamps by which the barrel and magazines are united. Fig. 4 is a cross-section on the line *yy*, showing the clamps provided with trunnions.

Referring to the drawings, A represents the barrel of the gun, which may consist under ordinary circumstances simply of a straight tube of uniform diameter. BB represent the two reservoir or magazine tubes, which are commonly made of a cylindrical form and of a diameter considerably greater than that of the barrel. These magazines, which are arranged one above and the other beneath the barrel and parallel thereto, are preferably composed of seamless wrought-iron tubing adapted to withstand heavy pressures. The barrel is at the rear end, connected with the two magazines by means of a breech-magazine, C.

This construction is advantageous in that it permits a large volume of air to pass directly into the barrel without changing its direction or course of movement, whereby the pressure is rendered more fully available against the projectile during the exceedingly short time which is required for the delivery of the projectile from the muzzle.

In practice it is found that the time required for the expulsion of the projectile is so brief, that if the air is compelled to change its course of direction while entering the barrel, or before acting upon the projectile, the pressure in the barrel and reservoir is not entirely equalized, and that consequently the full pressure of the air is not expended against the projectile ; hence the importance of the construction herein represented. The barrel is provided near its lower end with a valve, H, for controlling the admission of air thereto from the magazine. In advance of this valve the barrel is provided with a movable section, I, arranged to swing upon trunnions, TT, or otherwise movable in such manner that it may be opened laterally, so as to expose its ends and admit of the projectile being introduced.

In order that the magazines may properly stiffen and strengthen the barrel, Mr. Mefford connects the magazines and barrel firmly to each other at various points in their length by means of clamps, K.

The clamp at the inner or middle portion of the gun, or at the centre of weight, may be cast with trunnions, *c*, thereon, to give support to the gun and admit of its being mounted on a carriage of ordinary construction.

When the gun is to be worked at very high pressure, or when for special reasons a very large quantity of air is to be accumulated, Mr. Mefford proposes to employ three magazines grouped about the barrel, as represented in Fig. 5, or four arranged in the positions represented in Fig. 6.

The arrangement of the magazines above and below the barrel, instead of at its sides, is highly advantageous in that it reduces the width of the gun, and permits the same to be placed on a narrower carriage, and to be operated with greater convenience, and also in that it permits the employment of the section I, opening in a lateral direction, which is in practice desirable on account of the convenience of access thereto. It is further advantageous in that the resistance of the upper magazine to tensile strain, and the resistance of the lower magazine to longitudinal compression, are rendered available to assist in supporting the barrel, which would not be the case were the magazines arranged at the sides of the barrel.

The plan of the gun, described in the foregoing pages, is highly adapted to receive the new improvements of combining the forces of gunpowder with pneumatic power, invented by Mr. Mefford, which will quite double its present range.

The great and only danger of exploding the dynamite in the shell, is the shock it gets from the motive power in the gun in starting it from its state of rest; but when once in high motion in the calibre of the gun there is not the least danger in employing a very much more powerful force than compressed air. For, supposing compressed air at a thousand pounds pressure to the square inch imparts a velocity to the shell of 900 feet per second, its velocity is easily doubled without any more danger than is incurred in the first instance by starting it. This proposition is clearly self-evident. The point to be gained is to *get the dynamite in the shell used to motion*. Compressed air does this nicely, and prepares the shell to pass safely from a quick to a double-quick motion, by the exertion of a power on it through an agency much more potent than compressed air, whereby the velocity may safely be raised from 900 feet to 1,800 feet per second at the muzzle of the gun, which is about the maximum of rifled cannon. It is then not unfair to assume that a dynamite shell can safely reach as great a range as a rifled cannon can throw its projectiles, provided the dynamite shell in passing through the air suffers no more from friction than is incident to the rifled cannon's projectiles. But the difficulty incident to all guns employing only compressed air is the impossibility of adopting the rifled system in these guns on account of the weakness of their motive power, and therefore a form of projectile has to be used which subjects it to immense friction in its flight through the air, or no accuracy could be obtained. Hence the so-called Zalinski gun, at a very high degree of elevation, and obtaining 900 feet initial velocity, falls to the ground at a distance of only $1\frac{1}{2}$ miles. But Mr.

Mefford has invented a plan by which gunpowder can be used at the right moment after the projectile has attained a motion suitable to receive additional impetus, and the gun may be rifled, so as to impart the necessary twist to ensure accuracy, and thereby dispense with all the feathering and guiding appendages of the pneumatic smooth-bore projectile.

Another great drawback to cannon having only pneumatic power is the necessity for so much costly and unwieldy machinery for working the steam air compressors, the aggregate weight of which is from 15 to 20 tons, and the necessity for coal and water involved by the use of steam, the bulk of the machinery making it extremely vulnerable to an enemy's shot.

Mr. Mefford's new improvements dispense with all this, for he can charge the reservoir of the gun by means of small portable flasks of compressed air or gas; so, after the proper degree of compression is reached, the same can be maintained by driving back into the gun's reservoir all the air used in starting each shell successively, and retain it there by means of a check valve; for, when the cartridge of powder is exploded, its gases exert three or four times the power of the compressed air, and this power performs a double office—one to greatly increase the impetus of the shell, and the other to drive back the compressed air into the reservoir.

This has been fully tested by Mr. Mefford with satisfactory results.

The following description explains his combination of compressed air and gunpowder.

The accompanying illustration represents a sectional plan of the gun, shown in broken sections, indicating that the gun may be of any convenient or suitable length, in which A is the barrel, BB are the tubular reservoirs communicating behind the breech with the interior of the magazine C, for containing compressed air. The barrel has a section, I, of suitable length, provided with trunnions, T T, so as to swing open crosswise with the gun's calibre to receive the charge.

The breech end of section I is slightly enlarged to form a chamber for the reception of a lanyard, whose rear end is fixed to the base of section I, and coiled next its walls, leaving an unobstructed opening the full size of a gun's calibre through the centre of its circle. From the magazine chamber C is a passage J, in which the valve V is seated; the line of this passage is coincident with that of the calibre of section I when closed, or in line with the barrel of the gun A.

The stem of the valve V is extended backwards through a stuffing box, and has fitted on it a piston-head R, which works closely in the cylinder D. To this cylinder there is from the interior of C a small passage, governed by a stop-cock E, that can be opened by hand so as to admit compressed air to act on the piston head R, thereby operating together with the valve V, forming what is known as a balance valve, but preponderating so as to close automatically the opening J, by the compressed air in magazine C, but yet not so firmly as to prevent the hand from opening it by the lever F, operating the rod that works through the stuffing box. In operating the gun, section I is swung

open, the projectile, filled with dynamite or other explosives, is inserted, in rear of which a cartridge of quick powder is attached, provided with a friction fuze at its base for exploding it, to which the front end of the lanyard is secured. Section I is then swung back into line and locked; stop-cock E is opened to balance the valve, then by a quick movement of lever F, valve V is for a moment withdrawn, and the compressed air rushing through the opening J, drives the projectile and cartridge forward through the barrel, uncoiling the lanyard, and when its full length is reached the friction fuze is fired, but the projectile has reached so great a degree of velocity that no violent shock can be imparted by the explosion of the quick powder, though its range will be greatly increased from the effect of liberating such a large volume of gas in its rear, thereby doubling or trebling the driving power acting upon the projectile. At the same time, the greatly superior pressure of the gasses overcomes the pressure of the compressed air and drives all, or nearly all, the compressed air used in starting the projectile, back through the check valve V into the reservoir; and the valve working automatically, confines it there to be used in subsequent discharges.

This method of combining compressed air with gunpowder, in giving great range to projectiles charged with dynamite, does not require the barrels to be made with more than one-fourth of the strength of ordnance in which gunpowder alone is employed as the propelling force, for the reason that the projectile having already attained a considerable degree of velocity before the bursting charge of gunpowder has been fired, the projectile makes room so rapidly for the expanding gas of the powder that it prevents any severe strain upon the walls of the gun. On the other hand, experience has taught that immense strength must be given to a gun to enable it to withstand the terrific energy required to arouse instantaneously a ponderous projectile from its inertia of rest to a high velocity. No one can dispute the truth of the philosophy that teaches the fact that it takes the same power to impart a given amount of momentive force to a ponderous projectile in a state of rest as it takes to withstand the same amount of momentive force and bring it to a state of rest. The two forces are philosophically equal.

Now aside from being able to safely discharge shells charged with high detonating explosives by this method, may it not open up a wide field for experiment with rifled cannon, and the use therein of pneumatic power in addition to gunpowder?

The attention of those interested is called to this subject and investigation is urged on the following grounds:—

- I. That the strain on the cannon's walls is reduced to a minimum, by putting the projectile in motion before bringing the great driving power to bear.
- II. That when the projectile is put in motion, the major driving power possesses vastly greater influence in imparting desired velocity to the projectile, than it could if it had to start the projectile in motion from its state of rest.

- III. In consequence of the strain on the gun from the major power being greatly depleted through the first putting of the projectile in motion by the minor power, the necessity for thick-walled cannon is greatly lessened, and the walls under these circumstances may be reduced to about six inches in thickness, even for guns of the largest calibre. It is hoped that the ideas here briefly suggested may before long be proved to be practicable by actual experiments.
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Fig 1.

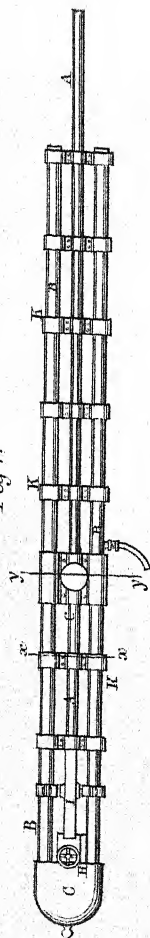


Fig. 2.

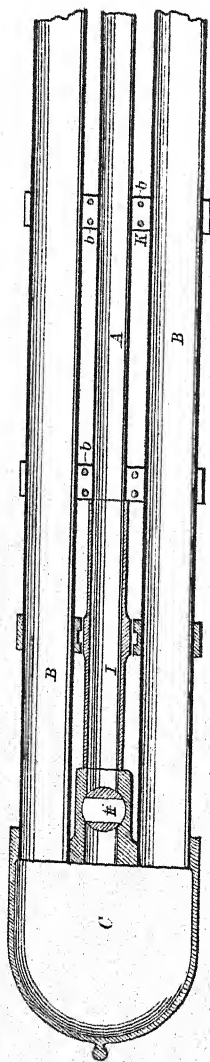


Fig. 6.

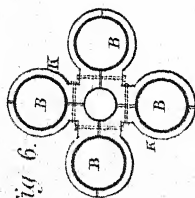


Fig 3.

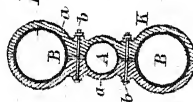


Fig. 4.

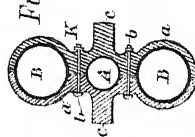
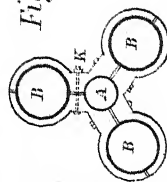


Fig 5.



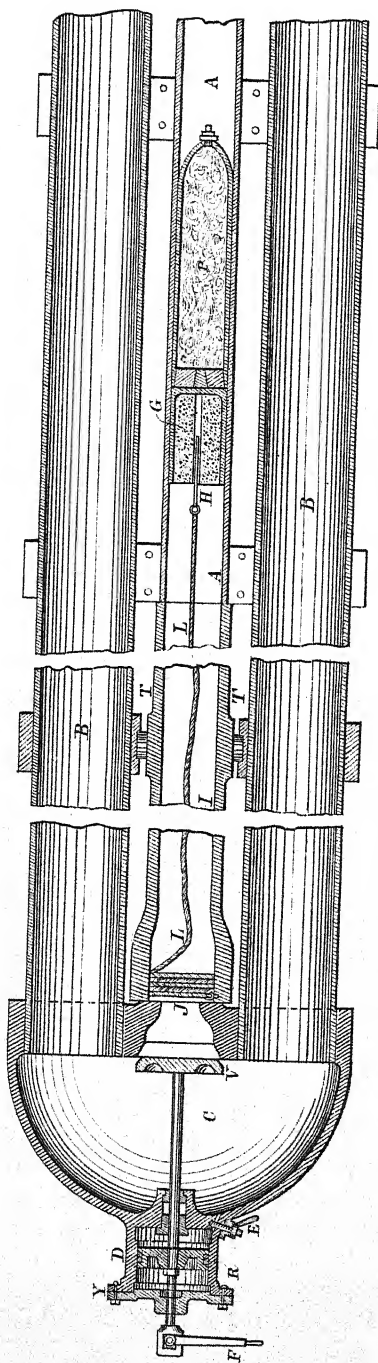


Fig 1.

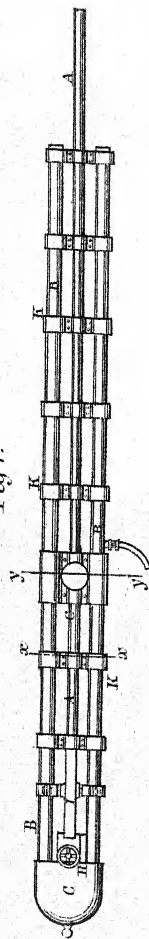


Fig 2.

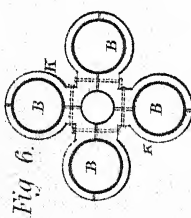
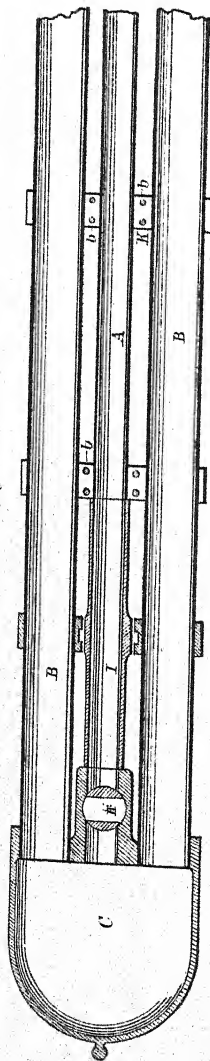


Fig 3.

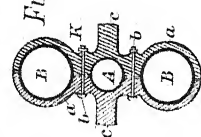


Fig 4.

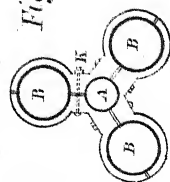
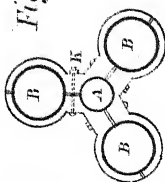
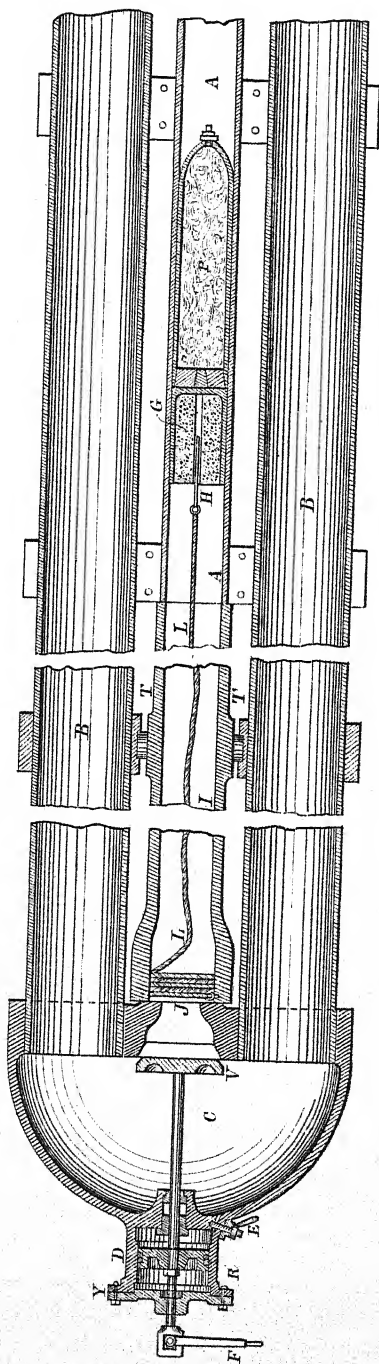
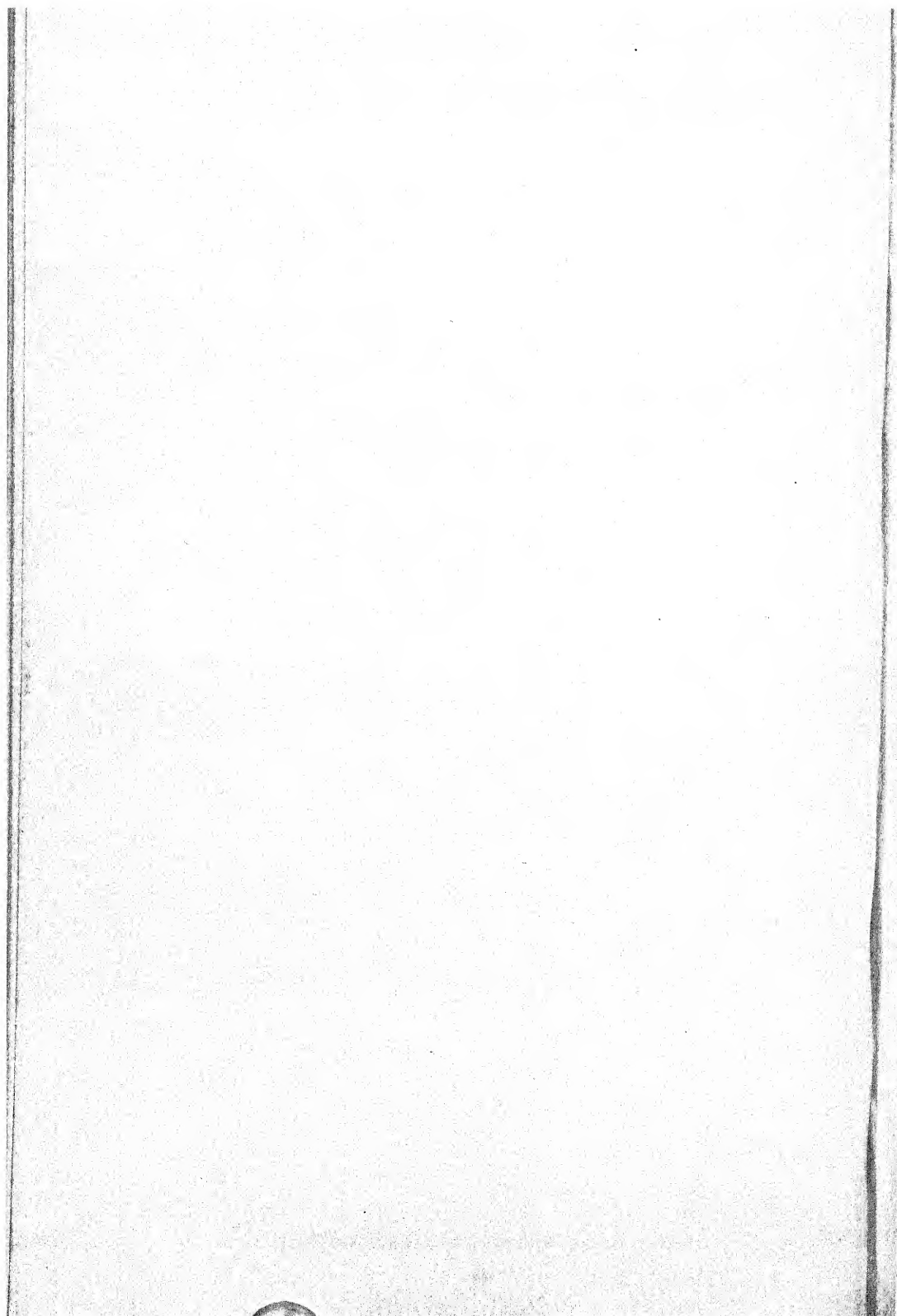


Fig 5.







OFFICER'S OUTFIT FOR INDIA.

BY

LIEUTENANT H. A. BETHELL, R.A.

THE first part of this paper has been compiled especially for my own Regiment, I hope, however, that the second part may be of use to officers of all branches of the Service. This paper has had the advantage of revision and criticism by several officers experienced in the various subjects of which it treats. To them, and to the officer who kindly contributed the notes on "Shikar," I take this opportunity of tendering my thanks.

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Plain kit.—Clothes—Hats—Boots—Underclothing—Brushes and Sundries—Plain Saddlery—Troopship Outfit, p. 389, *et seq.*
 Notes on Racing—Racing Outfit—Boxes—What to do before Joining—On Buying a Charger. Dogs—Notes on Shikar—Fishing—A Subaltern's Monthly Accounts—Summary. p. 391, *et seq.*

Uniform.—Clothes.

Your choice will lie between—

- a. Best London tailor.
- b. Regular Woolwich tailors.
- c. Army and Navy Stores.
- d. Cheap London tailor.
- e. Country tailor.

a. Prices at least 30 per cent. over Woolwich, material and workmanship possibly slightly better, not so long-suffering in the way of credit as the Woolwich men, not generally accurate as to regimental pattern.

b. These are good enough for most people, prices moderate. When I got my outfit (1880) there were three tailors at Woolwich, considered about equally good. The majority of my term went to Messrs. Daniell's, and I never heard any complaints of them. They certainly give long credit, and charge only 5 per cent. interest.

c. Material undoubtedly of the best. Cut may be good now, but was formerly not considered so. Cash down. This is especially inconvenient in ordering out things from home.

d. Cadets during their last term usually receive circulars from some London Firms, who offer to provide outfits at about two-thirds of Woolwich prices. Of these I can only say that I do not recommend them.

e. Country tailors, however honest their materials and workmanship may be, are never to be relied upon for strict regimental pattern and style.

To sum up, I would recommend one of the leading Woolwich tailors. It is of course best to pay cash down, but if circumstances render this impossible, do not go to a man who charges a high rate of interest.

LIST OF UNIFORM.

Tunic	...	...	...	...	...	...	...	...	1
Mess jacket, with hooks to use as stable jacket	...	...	...	...	...	...	...	...	1
Patrol with false collar	...	...	...	...	...	...	...	...	1
Serge patrols	...	...	...	...	...	...	...	...	2
Cloak and cape, Cadet's converted	...	...	...	...	...	...	...	...	1
Mess waistcoat...	...	...	...	...	...	...	...	...	1
Mess trousers (not converted)	...	...	...	...	...	...	...	...	1
Overalls, "Cavalry doe," pairs	...	...	...	...	...	...	...	...	2
Pantaloons	...	...	...	...	...	...	...	...	2
Cummerbunds, regimental	...	...	...	...	...	...	...	...	1
Forage caps	...	...	...	...	...	...	...	...	2
" " field service	...	...	...	...	...	...	...	...	1
Sea kit serge trousers, pairs	...	...	...	...	...	...	...	...	1
Helmets, white...	...	...	...	...	...	...	...	...	2

Remarks. A tunic is only worn in India for church, courts-martial, and rarely on parade. A second tunic is therefore unnecessary. The difference in wear between Cadets' and Officers' cloth is so great, that I do not think it worth while to have a tunic converted at a saving of about £3.

The stable jacket is rarely worn in India. I would recommend that one mess jacket, to serve also as stable jacket, be taken out. After a year or so a second stable jacket may be ordered. India is the very last place to keep unused clothes lying by. Wire lace should be used for all shoulder cords, it is well worth the extra cost.

Serge patrol. This is worn on nearly all parades during a great part of the year. Two are indispensable.

Mess trousers. The same remarks about conversion apply to these as to the tunic.

Overalls. Two pairs are enough to begin with—more can be afterwards ordered. They should be fitted well down on the spur, a point which tailors do not always attend to.

Pantaloons. The Woolwich maker's cut is very fair. But if you are going to a field battery, I think your riding kit, of all others, should be perfect in fit and style. There is no doubt that no one can cut breeches like a London hunting tailor—such as Tautz of Oxford Street—and him I would accordingly recommend.

White helmets. Hawkes of Piccadilly is the regular man. A second helmet—which may be of inferior quality, and need not have fittings—will be required to wear with a Khaki cover and in the rains. The Field Artillery ball and ornament differs from the Garrison pattern.

Blue helmet. If you have to serve in England before going out, have your Cadet's helmet converted.

Boots.

Jack boots, pairs	...	...	...	...	2
Wellingtons "	...	...	...	...	3
Dress Wellingtons, pairs	...	...	...	...	1
Jack spurs, pairs	1
Swan neck	3
Brass	2

(one with steel rowels).

Spur leathers, spare, pairs	3
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Perhaps most gunners get boots from Mr. Craig, of Woolwich. His work is sound enough and his prices low, but to jack boots the same remarks apply as to breeches. Peal of Oxford Street, Bartley, Fagg, and Kirby, all good men.

Much dismounted work has to be done in jacks, and it is a good plan to have one pair made with stout soles for this and for rough work. I would recommend one pair patent leather jacks with calf feet from Peale, one pair stout calf from Craig's. This also applies to Wellingtons. Jack spurs should be bought of the bootmaker, and fitted by him, the others at the Stores.

Belts.

Gold sword belt	...	...	...	...	1
Gold sabretasche and sling, (Field Batteries)	...	...	...	...	1
Gold cross belt and pouch	...	...	...	...	1
Gold sword knot	...	...	...	...	1

Undress.

White sword belt	...	...	...	...	1
Webb " " (tasche and slings for Field Batteries)	...	...	...	...	1
Spare slings, sets, (Field Batteries)	...	...	...	...	2
Cross belt and pouch	...	...	...	...	1
Sword knots	...	...	...	...	2
Web suspenders	...	...	...	...	1
Spare billets, sets	...	...	...	...	1

Gold belts at the stores. White belts, for choice, from the tailor. The enamel should be thick and somewhat cream coloured. The greenish white highly glazed belts are French, and do not wear well. India is a very bad country for white belts, and slings especially have to be frequently renewed. A new black pouch and sabretasche will be required at the end of the first year.

Arms.

Sword, complete, with bag and leather case	...	...	...	...	1
Revolver and lanyard	...	...	...	...	1
Cartridges, tin boxes of 50	...	...	...	...	2

Sword. For many reasons it is desirable that an officer's sword should be the best that money can procure. The most noted sword-

maker is certainly Mr. Wilkinson of Pall Mall, and I think his established reputation justifies his high charges. But I would observe that a sword probably equally good in all but the name, can be obtained from other makers at less than half the price. In selecting your sword, choose a light blade, both for comfort and efficiency. I do not recommend nickel plating for the scabbard.

Revolver. A revolver should shoot straight, be not too heavy, and of simple construction. With regard to the first point, I would say, do not buy a revolver until you have tried and satisfied yourself that you can shoot with it. For the second, the principal advantage of a long heavy revolver is the distance it carries, which, as the revolver is essentially a short range weapon, is of no great use. A heavy revolver is not convenient to carry at one's belt. For the third point, you will have to choose between the convenience of a self-extractor (no doubt a great advantage) and the strength and simplicity of a solid frame (as a Colt). Personally I prefer the former. "Dull nickel" plating is useful to prevent rust. Almost every pattern of revolver can be bought and tried at the Army and Navy Stores. Eley's ammunition (not always fresh) can be bought at most Indian stations.

Saddlery (Field Artillery).

By far the cheapest plan is to go to a really good maker. After a couple of years of India an inferior saddle gives out, and becomes quite unfit for parade. Have your saddle made to fit you, and not too big or too wide in the tree. Plain flaps are neater and more durable. As, however, a considerable portion of your life will be passed in this saddle, it is well to have it as comfortable as possible, and if knee rolls suit your seat, by all means have them. Good makers are Wilkinson & Kidd, Sowter, Nicholls, Whippey, and Prat.

Miscellaneous.

Gloves, pairs, thick and thin	3
Glove trees	1
Boot trees, long, at least	2
Buttons, { gilt ball	24
{ gilt, flat, small	6
Stars, metal or embroidered	6
Foot-straps, buckles, pairs	6
Boot-hooks, long, pairs	1
Spare rowels, pairs... ..	6
"R.A.'s," gilt, for shoulder cords, pairs	1
Tin uniform case	1
Tin helmet case	1
Saddlery case	1
Burnishers	3
Cutting whips... ..	1

Remarks. Except boot trees, all these may be bought at Army and

Navy Stores. The tin lining of the saddle box should be made with a lid and hasp, and should not be soldered down.

Uniform to be bought after joining your Battery.

White suits	12	Khaki { breeches, pairs ...	1
Khaki " say	3	serge jacket	1
Sam Browne belt	1	Field service boots, pairs...	1
Wooden scabbard	1	Ebonite water bottle	1

As these things vary considerably in pattern, it is desirable to leave the choice of them to your Major.

Books and Instruments.

A complete set of Service books (*vide Queen's Regulations, section VII., para 26*) is required. Besides these, it is well to take out the rest of the Service books which were supplied to you at the R. M. Academy, and all the instruments. Most of them will be required in passing your examinations for promotion. The Text Book of Military Law, Orde Browne's Field Artillery Notes, and O'Dowd's Hints to Courts-Martial will also be found useful. A field glass to suit your sight (Stores) may be taken. The following are also required :—

Visiting cards and plate	1	Note books, small	3
Watch	1	Penknives	1
Clock	1	Despatch box, fitted	1

Watch. Delicate cylinder watches are unsuited to India. A good English lever is the best. Waltham watches (Robins and Appleton, Holborn Circus), are good and cheap.

Clock. A cheap Yankee alarum clock is most useful. Despatch box, Army and Navy Stores, 32s. to 42s. Should contain papers and all writing materials.

PLAIN KIT.

Clothes. The quantity of plain clothes required depends upon your own tastes, and upon whether you are going to a place like Bombay or a small up-country station. The following is a minimum for an average small station.

Clothes.

Dress Suit	1	Tweed breeches and gaiters	1
Black morning coat and waistcoat, suit	1	Cord breeches	1
Morning suits (one not too thin)	3	Overcoat	1
		Flannel trousers	3

Hats.

Grey felt helmet	1	Round felt hat	1
Double Terai hat and silk puggaree	1	Tweed hats or caps	2

Boots.

Dress shoes, pairs	1	Brown leather shoes, pairs...	1
Walking boots and shoes, pairs	3	Tennis or racquet shoes	1
Riding boots (<i>see p. 387</i>) ..	1		

Remarks. Riding boots may be black or brown butchers, Newmarket or field boots. Brown butchers are most useful. One pair is perhaps enough to begin with.

Underclothing, &c.

White shirts	12	Collars, say	24
Uniform "	12	Towels { bath	6
Coloured " say	6	{ small	12
Flannel " white, with collars	4	Sheets, pairs	4
Jerseys {	merino, stout	Blankets, thick... ..	1
	" very thin	" thin	3
	thick, unbleached wool	Pillow cases	6
Drawers, twilled cotton, stout, pairs	6	Sleeping suits (pyjamas) ...	6
" " " thin " "	6	Dusters	12
" merino, warm	2	Neckties, various	
Socks, {	silk, dress	Neck handkerchiefs, large,	
	cotton or merino	silk, (regimental pattern)	1
	thick woollen	Merino, R. M. Academy ...	2
Handkerchiefs, small size ...	24		

Remarks. The foregoing may be bought at the Army and Navy Stores, at some outfitters, such as Thresher & Glenny's, Strand, or at Whiteley's, for ready made articles I think the last is not to be equalled. Shirts should of course be made to measure. Thresher & Glenny, among others, are noted makers. Uniform shirts are made of thin material without starched fronts. Some people prefer them to button at the back. Flannel shirts should be *thoroughly* shrunk. The thick woollen jerseys, drawers and socks are absolutely necessary, both on board the troopship and in India on the march. Handkerchiefs to wear in uniform must be small. All round "Guards" collars are worn in uniform with the serge and Khaki jackets, and I recommend that they be made with button holes to button inside the collar of the jacket. Cotton sheets are said to be more healthy in the Indian hot weather. Pyjamas are made of special cloth, either cotton or thin wool, to taste.

Brushes and Sundries.

Hair brushes	1 or 2	Braces, pairs	4
Tooth "	2	Belt	1
Nail "	2	Shaving glass	1
Shaving "	1	Nail scissors	1
Cloth "	1	Stable "	1
Hat "	1	Tooth powder, box	1
Boot "	3	Hammer	1
Horse "	3	Large screw driver	1
Button "	1	Leather punches	2
Harness brush, soft	1	File	1
Sponges	2	Saddle paste, tins	1
Razors	2	Button hooks	1
Strop... ..	1	Canvas bag, soiled linen ...	1
Comb	1	Burnishers... ..	1
Currycombs	2	Sticks, of sorts	-
Button stick	1	Hunting cap	-
Shoe horn	1	Sponge bag "	-
Housewife, fitted	1	Kid gloves in stoppered glass	
Pocket Knife	1	bottle, pairs	12

Plain Saddlery.

Saddle complete, about 10 lbs. ...	1	Extra stirrup leathers, pairs ...	1
Bridles, double	1	Hoof picker	1
" snaffle, all over buckles ...	1	Clothing, summer (not made up) suits	2
Bits, " of sorts	2	Rollers	1
Martingales, running	1	Bandages, woollen, sets ...	6
Girths, pony, pairs	1	Sponges, small, pieces	4
Bridles, watering	2	Leather chamois	2
Head collars, stable	2		
Kneecaps, pairs	1		

Remarks. The best makers are Boyce & Rogers of Newmarket, and those mentioned under Military saddlery. Of course the best saddlery will prove the cheapest; still a useful saddle can be bought at about half the leading makers' prices. The Army and Navy Stores supply fairly good saddles, and those of Messrs. Davis, Charing Cross, are noted for cheapness and wear, though not for style.

Second-hand Saddles.

At several shops in London excellent second-hand saddlery, by the best makers, can be bought at about half price. A Whippy or Sowter saddle in good condition is far preferable to a cheap new one.

Bryant, 1, Chapel Place, Belgrave Square, has a large stock of good second hand saddlery. Horse clothing can be had good and cheap from Davis, Charing Cross. Should be taken out not made up.

TROOPSHIP OUTFIT.

Chairs, deck (American hammock)	1
Holdall's, holland	1
Clothes bag, large, with lock and key	1
Napkins, table, common	12
Eno's fruit salt, bottles	1

Remarks. See *Queen's Regulations, Section XVII.* The following must be taken in the cabin:—

- Uniform, except riding kit and gold belts.
- 3 pairs Wellington boots (not dress).
- 1 pair steel spurs, 1 pair brass (for landing).
- 1 pair bath slippers, 1 pair shooting boots, 1 pair canvas shoes; some C. O.'s allow these to be worn on deck.
- White helmet, forage cap and field cap.
- All white shirts, collars, jerseys, drawers, socks, pyjamas, handkerchiefs, and towels. No washing—or none but very rough washing—can be done on a troop-ship.
- Toilet requisites, including soap, in the holdall.
- Despatch box, writing and sketching materials, and novels. It is also customary to take Forbes' Hindustani Manual.
- Pipes and tobacco to last to Malta.

RACING.

At almost every Indian station "gymkhana" racing is a regular amusement. Every month or so, at a good sporting station, small

meetings are held, of which pony racing, on the flat and over jumps, charger races, and fancy competitions, such as boot and saddle races, form the principal features. "Sky races," on rather a larger scale than gymkhanas, come off about once a year, and at most of the larger stations regular race meetings are held in the cold weather. Gymkhana racing is not expensive—entries something like two rupees, and twenty rupees added money—and is an excellent amusement, in which all mounted corps join. The following list of articles will be found useful for gymkhanas, and necessary for regular racing:—

Racing outfit.

(In addition to other Lists).

Saddle, 4 to 7 pounds, complete, at least ..	1
Snaffle bridles, all over buckles	1
" bits, thick	1
" " ring	1
" " chain	1
Martingales, running	1
Spare girths, pairs	1
" leathers	1
Weight cloth, complete	1
Horse clothing, summer suits	1
Scrapers	2
Breeches, buck or kersey, pairs	1
" trees, pairs	1
Racing top boots "	1
" spurs "	1
Cutting whip	1
Bandages, sets, woollen	6
" " Newmarket	2
Summer body net	1
Knee caps, pairs	1

Remarks. If you go in for racing it is well to have your tackle really good. Boyce and Rogers of Newmarket are the leading racing saddlers.

Boxes.

One bullock trunk, one portmanteau, one Gladstone bag, one tin hat box, and one tin despatch box will be required; saddlery (unless the racing kit is taken) will go with the regimental saddle—as also boots, brushes and sundries. The remainder of the kit previously detailed, without the extra lists, will go into a No. 2 troopship size case (see *Queen's Regulations, section XVII., para. 34*).

Whiteley's is as good as any place for the first four; despatch box, see p. 389; tin-lined troopship case from Silver, Cornhill, or the Army and Navy Stores.

As soon as you are posted to a battery, you should—

1. Go or write to the R.A. Institution, they will give you full information about your station and your battery.

2. Write at once to your Major. Tell him as near as possible the

exact date you sail, and ask whether you can bring out anything for the Mess or the Officers. Ask him to look out for a bungalow for you, and (if a Field Battery) for a horse and pony. Tell him your riding weight, and if you want to take a horse out of the Battery say so.

3. Make arrangements with Messrs. Cox to pay your band subscriptions yearly, also Regimental Charities, and anything else you wish to subscribe to yearly, and leave a three years' balance in their hands for the purpose.

Notes on Buying a Charger.

You will learn from your Major whether to buy an Arab or a Waler, and whether he prefers any particular colour. Persians, Gulfs, and country bred horses are not, as a rule, good enough for chargers. An Arab will be bought in Bombay. If you are a moderate weight you may get one for Rs.1000; if you are a heavy weight, and can't ride under 12 stone, he will cost Rs.1500 to 2000, and be hard to find at that.

Walers. If you are posted to a Battery on the Bombay side, you may be able to pick up a broken charger in Bombay, Poona or Kirkee; if so, you will probably hear of him at the R.A. Mess, Colaba (Bombay). A good Waler may be bought from Rs.750 upwards. If you are bound for the other side of India, you will not buy your horse till you have joined your Battery.

Selecting from the Ranks.

You can (with your C. O.'s permission) select any horse from the Battery or a Government Depôt as a charger. The price is Rs.500, payable by eight monthly instalments. You can return him to the ranks when you please, provided that he is fit, receiving back the purchase money, less 10 per cent. a year for every year by which the horse's age exceeds five. If returned within a year from date of taking out, no deduction.

Horses suitable for chargers are not as a rule to be found in Gulf Arab Batteries.

A Waler selected from a Government Remount Depôt may turn out well, but very often doesn't.

A horse selected from the Battery is a very cheap and safe purchase, as his good and bad points are well known. It is, however, the exception to find a suitable charger available. This you will learn from your Major before you join.

Ponies. A Field Battery Subaltern must have one pony, as no horse could stand the work. You will get him after joining your Battery, price from Rs.100 to 200. If you want a really good pony to do a little racing with, you can get an Arab at Bombay for about Rs.500.

Dogs. Fox terriers are by far the best to bring out. They are more useful and stand the climate better than any other English breed. Arab greyhounds are very nice dogs, and can sometimes be picked up at the Arab stables in Bombay.

TO BE BOUGHT IN INDIA.

(Field Batteries).

	Rupees.
1 charger, say	1000
1 pony "	150
1 80 lb. tent	—

Camp Furniture—

2 sets warm horse clothing ...	20
12 suits white uniform	60
3 " Khaki "	18
1 Khaki serge jacket	7
1 pair Khaki breeches	10
4 cotton " jharran " suits	24
3 pairs Polo breeches	30
1 set mosquito curtains	7
Tatties, rezai, punkah frill, pur-	
dahs and durries	30
1 pair Polo boots	10
Shikar suits, cotton, each	6
Shikar hat	5
Polo sticks, hog spears, &c. ...	20

Total, say 1400

Remarks. Camp furniture made up by Battery artificers. Tent and horse clothing, Elgin Mills, Cawnpore. "B" horse clothing recommended. Cotton clothes by the local artists, they will make very creditable copies of Tautz's breeches. A shikar hat is a battery helmet with wadded cotton cover and coal heaver flap.

If you have to procure any article of uniform in a hurry, Messrs. Badham & Pile of Bombay, Poona, and Secunderabad, are excellent military and plain clothes tailors. Prices may be reckoned at about a rupee to every shilling of Woolwich price.

Shooting Kit.

The question of what guns should be taken to India is really almost solely one of expense. If only one gun can be afforded, it should be a double-barrel B.L. 12-bore, right barrel to fire ball, left choke, with, of course, the usual cartridge loading apparatus and bullet mould. The question of whether hammerless or not, and what closing action, is a matter of individual taste. A spare set of locks which would comprise the whole of the mechanism within the lock plates should be taken, as it is most disappointing to find when in the jungle, far from any large town, that all sport is spoilt by some pin or other part failing. This is especially needful with a cheap gun. The next weapon should be a .500 Express (.500 for general work is preferable to .450). A cheap Express rifle is a very dear weapon; it should not be bought without first trying it well. Messrs. Holland, of Bond Street, make a very good and accurate Express D. B. .500 for about £35, and it can always be tested at their shooting range.

The next weapon, unless there is a certainty of big game shooting, would be a second 12-bore gun—both barrels cylinder.

For large game shooting a weapon carrying a heavy ball is required—i.e., an 8-bore or 4-bore; the choice of this must depend on the strength of the buyer. A second-hand one should be procured if possible. A 12-bore rifle is a useless class of weapon, as it is neither one thing nor the other.

For a country like Sind, where there is a great deal of snipe and quail shooting, a 20-bore gun is a very handy weapon; it is lighter to carry, and the saving in cost and weight of ammunition is considerable.

A D. B. 16-bore M. L. gun is a most useful weapon to give to one's shikari (as, for instance, to shoot for the pot when out after large game) or to lend to the men of the battery. Cost £5 or less.

If you are anything of an ornithologist, a collector's gun, S. B. 450, price £2, from Jackson, Nottingham, is very handy.

Ammunition.

The gunmaker is the man to consult about ammunition. Messrs. Holland sell three descriptions of Express rifle ammunition—(1) ordinary, (2) light, and (3) heavy, for big game. It is better to get (1) and (3) only. Holland's ammunition can always be obtained from their Bombay agents, King, King & Co., still it is better to take out 200 of (1) and 100 of (3).

Prices at Bombay.

	Rupees.	Annas.
Curtis & Harvey's No. 6 powder, per lb. ...	2	0
Shot, per lb.	0	4
Brown cartridge cases, per 100	2	8
Black waterproof wads, per box	1	8
Card wads, numbered "	1	8
Felt wads, per bag	1	4

As has been said, rifle cartridges loaded by the maker can be got in Bombay, but for guns loading apparatus is essential. The machines to load 100 at a time usually get out of order from the parts warping. A useful charge measurer is Jones' "accuratus," and by means of this, and a little organization of servants, cartridges can be loaded quite fast enough.

Brown cases are quite good enough, but 100 greens should be taken for special occasions as the browns frequently miss-fire.

Two or three large size brown canvas cartridge bags should be taken, and one or two all leather cartridge belts. A couple of pairs of brown canvas lace-up gaiters are required.

English-made shikar clothes are useless, as better ones can be got in India; boots however are an exception, they should be what a London maker calls shooting boots, i.e., not too heavy, and with few, if any, nails. Half-a-dozen pairs of thick felt soles are required for hill work.

Indian cooking pots are of tinned-copper fitting into one another. Enamelled iron is a great improvement on these. A set of six, with removable handles, a digester for making an *all-blaze* stew, cups,

saucers, plates and milk jug, should all be of enamelled iron. Bone or horn cups, &c., always crack. Useful silver-plated ware can be obtained in India, from Soondi Lali, plater and gilder, Shazadmandy, Agra, who would send his illustrated list on application. A set of drinking cups in leather case, and a set of muffineers with bayonet joints are recommended. Natives soon spoil screw joints.

Jungle Cookery. Though most native servants are excellent cooks under adverse circumstances, yet it is just as well to know something of cookery one's self, as it adds greatly to one's comfort in the jungle. A knowledge of how to make soda cakes especially should be obtained.

The fancy articles seen in Thornhill's shop and elsewhere, called shikar knives, are by no means the best to bring out. The best shape is the ordinary butcher's knife, with a blade six to eight inches—not longer—and a plain leather sheath with two keepers for the waistbelt. Bring out two or three of these. Two hook-handled thick oak sticks will always be useful; also a couple of regulation felt-covered water bottles. A pocket compass should be of nickel, hunting watch pattern, with bar needle (Stores, 12s. 6d.).

Books. Saunderson's "Thirteen Years amongst the Wild Beasts of India" is about the best. Sterndale's "Mammals of India" is handy; Barne's "Birds of Bombay" gives a list of all birds found in the Bombay Presidency, and is useful for identifying various duck and other birds which may be shot.

A small telescope is required for shooting in the hills, good glasses of German manufacture can be obtained at the Stores.

Tents, camp furniture, bedding, and small camp gear, lamps, &c., can be readily and cheaply obtained in India.

A waterproof sheet (or two) is indispensable.

A pack saddle is quite useless.

Fishing.

If you intend to go in for this, buy "The Rod in India," by Thomas. It contains full information as to purchase of kit.

The estimate of a Subaltern's monthly accounts (p. 397) may be of use:—

The figures refer to a small up-country station in Bombay or the north-west. At a large station mess bills would be somewhat larger, and horse keep dearer. In Bengal or Madras messing, horse-keep and wages would be rather cheaper.

It would not be easy to reduce any of the above items. With the exception of wine and cheroot bill, mess bills at other messes, and keep of dog, they practically represent necessities.

Extra allowances.

The Subaltern in charge of Battery transport (if any) gets Rs. 30 a month. Subaltern Acting Adjutant, about Rs. 100. For passing Lower Standard Hindustani, Rs. 180, of which about half goes to the Moonshee. No money is to be made out of the higher standard. Government prizes are given for passing in Persian, Arabic, and many other languages.

It should be noted that the R. A. Institution, Woolwich, will bear part of the expenses of any three Officers working together at a language for which no reward is offered by Government.

Cr.

Pay and Horse Allowance (30 rupees)	Rs.243	5 annas.
Or over 3 Years' Service	Rs.295	12 annas.

Dr.

	Rupees.	Annas.	
<i>Mess Bill.</i>			
Battery Subscriptions	10	0	
Mess Subscription	4	12	
Newspapers	4	0	
Billiards	2	0	
Lawn Tennis	2	0	
Messing	60	0	
Wine, Cheroots, and Ice... ..	25	0	
Mess Guests	7	8	
Extra Messing and Stores	10	0	
Total Mess Bill... ..	...	...	R. A. 125 4
<i>Station Subscriptions.</i>			
Gymkhana, including Polo, Lawn Tennis, &c.	10	0	
Pigsticking	5	0	
Library	3	0	
Assembly Rooms	5	0	
Mess Bills at other Messes, &c.	10	0	
Total ... ..	...	...	33 0
<i>Horse Keep and Stable Expenses.</i>			
Food for one horse, about	15	8	
For pony	10	8	
Charger—Syce's wages	10	0	
Pony Syce	8	0	
Shoeing	5	0	
Cleaning traps	2	0	
Repairs and wear and tear of saddlery, &c.	5	0	
Total ... ..	...	...	56 0
<i>Household Expenses.</i>			
Butler's pay	15	0	
Cleaning boy	5	0	
Dhobie (washerman)	5	0	
Sweeper	3	0	
Chowkidar (night watchman)	3	0	
Bhistie (water carrier)	3	0	
Punkah coolie	2	0	
Rent and taxes, share, say	25	0	
Cleaning traps	2	0	
Lights... ..	2	0	
Fuel	3	0	
Furniture hire	5	0	
Sundries	5	0	
Bazaar tailor, wear and tear of white uniform, new underclothing, &c.	10	0	
Shoemaker... ..	1	0	
Keep of 1 dog	7	0	
Barber	2	0	
Total household Expenses...	98	0	
Grand Total ... ..	...	...	312 4

Not included in this list are—

Private guests. Subscriptions to Entertainments, &c. Maintenance of uniform, boots, belts and saddlery. Maintenance of plain clothes and boots. Travelling. First cost of horse, pony, tent, camp and stable gear, and small articles of furniture. Yearly depreciation in value of horse and pony, at 10 per cent., say Rs.10 per month. Entrance donation to Mess, Library and Hunt.

SUMMARY.—UNIFORM AND SERVICE KIT.

Number.	Name of Article.	Where obtained	Remarks.
1	Tunic	Daniels.	Wire lace.
1	Mess jacket	"	Hooks to use as stable jacket.
1	Patrol	"	—
1	False collar	"	—
2	Serge patrols	"	—
1	Cloak and cape	"	Cadet's converted.
1	Mess waistcoat	"	—
1	Mess trousers, pairs	"	Not converted.
2	Overalls, pairs	"	Cavalry doe.
2	Pantaloon, pairs	Tautz.	—
2	Forage caps	Daniels	—
1	F. S. forage cap	"	—
1	Sea kit trousers, pairs	"	—
2	Helmets, white	Hawkes.	One only with fittings.
1	Cummerbund, regimental	Daniels.	—
1	Jack boots, pair	Peale.	Patent leather legs.
1	" " " "	Craig.	Stout soles.
3	Wellingtons, pairs	"	—
1	Dress Wellingtons, pair	"	—
1	Jack spurs, pair	Peale.	—
1	" " " "	Craig.	—
3	Swan neck spurs, pairs	"	—
2	Brass " " " "	"	One with steel rowels.
3	Spur leather spare, pairs	"	—
1	Gold sword belt	Stores.	—
1	Gold sabretasche and slings	"	—
1	Gold cross belt and pouch	"	—
1	Gold sword knot	"	—
1	White sword belt	Daniels.	—
1	Web " " " with sabretasche and slings	"	—
2	Spare slings, sets	"	—
1	White crossbelt and pouch	"	—
2	Undress sword knots	"	—
1	Web suspender	"	—
2	Spare billets, sets	"	—
1	Sword complete, with bag and leather case	Wilkinson.	—
1	Revolver and lanyard	Stores.	Leather case with Sam Browne belt.
2	Cartridges, tin boxes of 50	"	—
1	Saddlery, regimental, set complete	Sowler.	—
1	Leather numnah	"	—
1	Sundries	Stores.	See "List," page 390.
1	Tin uniform case	—	—
1	Tin helmet case	—	—
1	Saddlery case	—	—
1	Cutting whip	Stores.	—
1	Carpenter's tools	"	See "Sundries."
1	Brushes, toilet, boot and horse	Whiteley.	Do.
1	Cleaning traps	"	Do.
1	Plain saddlery	See List.	—
1	Deck chair	Whiteley.	—
1	Holland holdall	"	—
1	Clothes bag	"	—
12	Table napkins	"	—
1	Racing outfit	See List.	—
1	Bullock trunk	Whiteley.	—
1	Portmanteau	"	—
1	Gladstone bag	"	—
1	Tin hat box	"	—
1	Tin despatch box	Stores.	—
1	No. 2 Troopship case	"	—
1	Regimental books	R. A. I.	Queen's Regulations, VII., § 26.

Other articles see Special Lists,

WAR SERVICES

OF

CERTAIN OFFICERS OF THE REGIMENT WHICH ARE NOT GIVEN IN KANE'S LIST
AND OF CERTAIN OTHERS WHICH ARE ONLY IMPERFECTLY GIVEN.

COMMUNICATED BY

GENERAL SIR J. H. LEFROY, C.B., K.C.M.G., F.R.S., LL.D., R.A.

No. 15.

LIEUT.-GENERAL HENRY HUTTON, R.A.

DIED 28TH JUNE, 1827.

GENERAL HUTTON commenced his military career in 1777 when a subaltern, and after his promotion to the rank of Captain he served several times in various parts of the West Indies, and in Gibraltar.

In 1794 he served with the forces under the command of the late General Sir Charles Grey at the capture of the Islands of Martinique, Guadaloupe and St. Lucia, after which he was appointed to the command of the Artillery at Grenada, from whence some few months afterwards, when the enemy had recovered possession of a great part of Guadaloupe, he returned with the permission of the Commander of the Forces upon urgent private affairs. Having upon his arrival in the island repaired to Briggen, Graham's post at Berville, and finding the detachment of Artillery extremely reduced by sickness without any officer capable of doing duty, and an attack on the post being immediately expected, he felt it his duty under such circumstances to offer his services to Brigadier-General Graham, and afterwards mentioned him in a letter to the Commander of the Forces in very flattering terms.

The enemy having on the 30th September made the expected attack, he was wounded by a musket ball which deprived him of the sight of his right eye, he afterwards became prisoner of war, with the small remnant of the troops whose numbers were hourly diminished not only by the enemy's fire on the post, but also by the severe sickness which continued to prevail.

After his return to England, having been exchanged in 1796, he

served with his company in various situations on the coast, &c., during the remaining years of the war, and upon the renewal of hostilities in 1803, having been promoted in the preceding year to the rank of Lieut.-Colonel, he was appointed to the command of the Artillery of an extensive district in Ireland, which situation he held till 1811, when he was promoted to the rank of Major-General. The 19th July, 1821, he rose to the rank of Lieut.-General.—*Naval and Military Magazine, September, 1827.*

PRÉCIS
AND
TRANSLATIONS.

“REVUE MILITAIRE DE L'ÉTRANGER.”

NOVEMBER, 15th to 30th, 1887.

BY

LIEUT.-COL. J. H. G. BROWNE, LATE R.A.

PRESENT ORGANIZATION AND STRENGTH OF THE RUSSIAN ARTILLERY.

In two articles the *Revue Militaire de l'Étranger* recapitulates the information given in previous numbers on the constitution of the Russian Artillery, and gives a general idea of the organization of that Arm, with special reference to the most recent modifications.

Subsequently, the effective strengths on the peace and war footings are treated of :—

FIRST PART.—ORGANIZATION.

It is seen that the Artillery contains organized units belonging to each of the great divisions, into which the elements which compose the army are divided. The Field Army contains Field, Horse, and Mountain Artillery; the Reserve and Depot troops comprise a certain number of Field Batteries; the local troops include the elements of Garrison Artillery, and lastly, the Cossacks and irregular troops supply a tolerably strong contingent of Horse Batteries. These last are included in the Field Army on account of the close connection which subsists between them.

(1.) *Field Army.*

The Artillery of the Field Army comprises :—

- a. Field Artillery.
- b. Horse Artillery.

Each of these sub-divisions containing a certain number of Mountain Batteries.

- c. Field Parks.

(a.) *Field Artillery.*

The Field Batteries are generally grouped by Brigades of six batteries, which are attached, at the rate of one Brigade per division, to the 48 Infantry Divisions.

The three Brigades of the Guard are numbered from one to three. Of the four brigades attached to the four Divisions of Grenadiers, the three first are numbered from one to three, the 4th is called the Artillery Brigade of the Grenadiers of the Caucasus, and has, as Honorary Colonel, the Grand Duke Michel Nicolaievitch.

The other brigades are numbered from 1 to 41.

Out of these 48 brigades, 42 have the same composition, namely, the two first batteries of each of them are heavy, that is to say, armed with guns of 42 lignes, and the four last batteries are light, that is to say, armed with guns of 34 lignes. The six other brigades, whose composition is different, comprise, each two heavy, two light, and two Mountain Batteries.

The brigades in Asia have no numbers, and bear the name of the military districts to which they are attached.

The Artillery of Turkestan and that of the two Siberias form a brigade in each of their military districts.

The brigade of Turkestan contains seven batteries; those of the two Siberias have only four each.

In addition to the above, there are three Mountain Batteries, not forming part of any brigade, which were raised at Kiev in the year 1885.

(b.) *Horse Artillery.*

The Horse Batteries are not brigaded, except those which constitute the Artillery of the Cavalry of the Guard, and which are six in number, one of which is furnished by the Cossacks of the Don.

All the other Horse Batteries are distributed in the following manner among the Cavalry Divisions :—

The two Divisions of the Guard, the Guard Brigade of Horse Artillery.

1st Cavalry Division	...	1st and 2nd Horse Batteries of the Army.
2nd "	"	3rd and 4th " " " "
3rd "	"	5th and 6th " " " "
4th "	"	7th and 8th " " " "
5th "	"	9th and 10th " " " "
6th "	"	11th and 12th " " " "
7th "	"	13th and 14th " " " "
8th "	"	{ 15th Battery of the Army and 1st Cossacks of the Don.
9th "	"	{ 16th Battery of the Army and 2nd Horse Battery of the Cossacks of the Don.
10th "	"	{ 17th Battery of the Army and 3rd Horse Battery of the Cossacks of the Don.
11th "	"	{ 18th Battery of the Army and 4th Horse Battery of the Cossacks of the Don.
12th "	"	{ 19th Battery of the Army and 5th Horse Battery of the Cossacks of the Don.
13th "	"	{ 20th Battery of the Army and 6th Horse Battery of the Cossacks of the Don.
14th "	"	21st and 23rd Horse Batteries of the Army.
Cavalry Division of the Caucasus	...	{ 1st and 2nd Horse Batteries of the Cossacks of the Terek.
1st Cossack Division of the Don	...	{ 22nd Battery of the Army and 7th Battery of the Don.
1st Cossack Division of the Caucasus	...	{ 1st and 2nd Horse Batteries of the Cossacks of the Kouban.
2nd Cossack Division of the Caucasus	...	{ 3rd and 4th Horse Batteries of the Cossacks of the Kouban.

The 5th Battery of the Kouban remains in hand; the batteries of the Cossacks of Orenbourg and of the Transbaikal, those of Turkestan and of Western Siberia do not enter into the composition of Cavalry Divisions.

In all, the Field and Horse Batteries, regular and Cossack, which enter into the composition of the Artillery of the Field Army in time of peace, are as follows:—

Field Artillery.—51 Brigades, comprising 98 Heavy, 188 Light, and 20 Mountain Batteries—in all, 306.

Horse Artillery.—One Brigade, comprising 48 Horse and two Mountain Batteries—in all, 50 Batteries.

(c.) *Field Parks.*

The ammunition Parks were re-organized in 1885 in the following manner:—

The Field Artillery Parks, marching with the armies, and the reserve dépôts established in rear of them, constituted the two great Divisions between which the supply columns were distributed.

The Field Parks were themselves divided into two categories; the first composed of the "Flying Parks" which formed the 1st echelon, and the second of the "Moveable Parks," forming the 2nd echelon. The Flying Parks again were sub-divided, in accordance with the troops to which they were attached, into "Divisional Flying Parks," belonging to Infantry Divisions; and into "Cavalry or Rifle Sections," marching with Cavalry Divisions or Rifle Brigades.

The number of Divisional Flying Parks was 48, corresponding with that of the Infantry Divisions. Each Park was divided into five sections, three of which carried Artillery ammunition and two Infantry ammunition.

The Cavalry Sections of the Flying Parks numbered 23, and the Rifle Sections 7.

The Moveable Parks numbered 14, comprising four sections, or a total of 56 sections.

The connection between the different Parks, enumerated above, and the permanent establishments of Artillery was maintained either directly or with the intervention of Reserve Dépôts, formed in time of war.

This organization was modified by the Imperial Order of 6th June, 1886.

By the terms of the new arrangements the Parks are organized as follows:—

Each Infantry Division with its Brigade of Artillery has a Flying Park in peace time. This Park forms, in case of war, two Parks of Infantry ammunition of 24 wagons, and two Parks of Artillery ammunition of 48 wagons.

The Flying Park Cavalry and Rifle Sections are suppressed.

The Moveable Parks contain 56 units, which are no longer called Sections, and are no longer equally distributed between 14 Parks, but are numbered from 1 to 56 under the head of "Moveable Parks," and distributed as follows:—4 at St. Petersburg, 4 at Dunabourg, 4 at Bobruisk, 4 at Brest Litovski, 8 at Kiev, 8 at Krementchoug, 4 at Koursk, 8 at Moscow, 4 at Tiflis. The rôle of these moveable Parks is two-fold. Some are intended for the active troops, and some in time of war to replenish the Flying Parks, and to keep up the connection between these Parks and the Dépôts established upon the lines of communication; and the others are attached to the Infantry Reserve Divisions, to which they stand in the same relation that the Flying Parks do to the active Divisions. To answer this double purpose, the Moveable Parks are attached to the active Corps d'Armées at the rate of one to every two Divisions. In the Reserve formations, the Infantry Divisions of the first line have two Parks each attached, and those of the 2nd line, one only. In the case of the active Corps d'Armées which comprise more than two Divisions, the number of Parks attached is one or two, according to the decisions of the War Minister and the Commander-in-Chief.

The men belonging to these Parks are kept in peace time at the Artillery Depôts of the military districts, and are called "Depôt Sections of Moveable Parks." The Sectional Commander is placed under the orders of the Depôt Commander.

Lastly, in addition to the Flying and Moveable Parks, there exist Local Parks, whose business in time of war is to replenish the Moveable Parks; and sometimes even the Flying Parks directly.

In peace time no *personnel* exists belonging to these Parks; the material only is placed in store at the Artillery Depôts of the military districts.

(2.) *Reserve Troops.*

The Reserve Artillery comprises five Brigades of six Batteries each.

In order to understand the manner in which the new units created on mobilization are formed, the detailed composition of each of the Reserve Brigades in peace time is here given:—

	Heavy Batteries of 2 Sections.	Light Batteries of 2 Sections.	Light Batteries of 1 Section.	Light Batteries of 2 Sections—1 Field, 1 Horse.	Light Batteries of 2 Sections—1 Field, 1 Mountain.	Total.
1st Brigade	1	1	3	1	—	6
2nd "	1	2	2	1	—	6
3rd "	1	1	3	1	—	6
4th "	1	2	1	1	1	6
5th "	1	1	2	1	1	6
	6	7	11	5	2	30

(3.) *Depôt Troops.*

The Artillery of the Depôt Troops, re-organized by the same order as that of the Reserve Troops, only contains two Light Batteries.

(4.) *Local Troops.*

The re-organization of the Reserve and Depôt Artillery has been accompanied by the creation of five Sortie Garrison Batteries stationed according to their numbers in Varsovia, Novo-Georgsievsk, Brest-Litovski, Ivangorod and Kovno.

The Garrison Artillery contains at present:—(1.) 50 Battalions which have nearly all four companies. The only exceptions are the four Battalions of Otchakof, of Sebastopol and of Kars, which have five companies, and the two Battalions of Poti-Mikhăilovski, which have only three each. (2.) Seven independent companies stationed at St. Petersburg, Viernyi, Samarcande, Tachkent, Perovski, and Vladivostok. (3.) Three detachments distributed between Odessa, Nicolaievsk (Maritime Province), and Askhabad.

The two instruction Batteries at the Officers' Artillery School at St. Petersburg, one of which is a Light Field, and the other a Horse Battery, may also be included in this category.

To recapitulate, the Russian Artillery on the peace footing contains 395 Batteries, of which 103 are Heavy and 221 Light, 49 Horse, and 22 Mountain, besides the battalions, companies, and detachments of Garrison Artillery.

II.—EFFECTIVE STRENGTH.

(1.) *Active or Field Troops.*

The different units vary considerably in strength, according to circumstances. The Field Batteries average six officers, about 200 men, and from 50 to 150 horses.

The Heavy Field Batteries have all the same strength in men, whether they belong to the Guard, to the Grenadier Divisions, or to those of the Army. They have only four pieces, with exception of the four Heavy Batteries of the 38th and 39th Brigades, stationed in Tiflis, which have eight guns and two wagons. Those of Turkestan have a special composition; both of them are on the war footing, as regards men, but the first has eight guns, eight wagons, one spare limber, and one heavy carriage, while the second has only four guns.

All the Light Batteries have the same composition, except the four batteries of the 38th and 39th Brigades, which, like the Heavy Batteries of the same Brigades, have eight guns and two wagons horsed on the peace footing.

The 19th Brigade, stationed at Armavir in the Province of Kouban, has one of its Batteries, the 4th, detached in the Transcaspian, which has eight guns, one spare limber, and the regular train required on the war footing.

The three Batteries of Turkestan and the three Batteries of Western Siberia have all of them eight guns. The two Batteries of Eastern Siberia have each of them four Light Field and four Mountain guns.

Strength of Horse Artillery Batteries.

The average strength of the Horse Artillery Batteries is 5 officers (except in the Cossack Batteries, which have from 7 to 10), nearly 200 men and about 160 horses. They have generally six guns on the peace as well as on the war footing, but the number of horsed carriages varies. Out of the five regular Batteries of the Guard; one only has two wagons, the four others have their guns only, while out of the 23 Batteries of the army, 14 have two wagons each, the other nine having none.

The Cossack Batteries of the Kouban and of the Terek have only four guns and two wagons, as well as those of the Transbaikal Cossacks. By a special order of 2nd July, 1886, the 4th Battery of the Horse Artillery Brigade of the Kouban in the Transcaspian Province, has six guns and six horsed wagons.

The Batteries furnished by the Voisko of Orenburg have six guns if they are stationed in Turkestan, and four guns only if they are in Europe. In either case, they have two wagons horsed.

Strength of Mountain Batteries.

The average strength of the Mountain Batteries is six officers, about 150 men, and from 30 to 90 horses, but the Horse Artillery Mountain Brigade of Turkestan has 74, and that of Siberia 22 troop riding horses in addition. All the Mountain Batteries carry their equipment on pack horses, except the 6th Battery of the Turkestan Brigade, which is called a "Steppe Battery," and which carries its equipment on wheels.

Only three of all these Batteries are armed with steel guns, the rest still have the old 3-pr. gun.

Field Parks.

Of these, only the Flying Parks and the Sections of the Moveable Parks are kept up in *personnel* on the peace footing.

The Flying Parks have three officers, 67 combatants, 9 non-combatants, and 6 draught horses.

The strength of the sections of Moveable Parks varies considerably.

Total.

Including Cossack, Turkestan, and Siberian Artillery, the grand total strength of the Russian Mounted Artillery of the first line is 76,800—viz., 2,387 officers, 39 specialists, 68,335 combatants, and 5,539 non-combatants. The horses amount to 23,789—viz., 1,788 officer's horses, 7,782 troop riding horses, 11,684 gun and wagon horses, and 2,535 heavy carriage horses. The number of guns is 1610, and of wagons 144.

Reserve Troops.

The Reserve Artillery comprises 30 Batteries of different compositions. They average 11 officers, about 200 men, with four guns. The total strength is 6,290 men—viz., 330 officers, 5,330 combatants, 630 non-combatants, with 1,571 horses, 98 guns, and 4 wagons.

(3.) Depot Troops.

The composition of the two Depot Batteries is different. One of them has only one section of two pieces, the other has two sections, one Field and the other Horse.

The single-section Battery has 11 officers, 171 combatants, 21 non-combatants, 10 officer's horses, 11 troop riding horses, 14 gun horses, and 6 heavy carriage draught horses. The strength of the double-section Battery is 11 officers, 183 combatants, 21 non-combatants, 10 officer's horses, 32 troop riding horses, 26 gun draught horses, and 6 heavy carriage draught horses.

(4.) Local Troops.

(a.) *Sortie Garrison Batteries.*—These five Batteries have only two guns each in peace time. Their strength is uniform, and comprises:—11 officers, 112 combatants, 14 non-combatants, 10 officer's horses, 8 troop riding horses, 14 Artillery draught horses, and 4 heavy carriage draught horses.

(b.) *Garrison Batteries.*—The usual number of Batteries in each of the Garrison Battalions is four, but some of them have five, while others have only three. The strength on the peace footing is three officers, one of whom is a Captain, 112 combatants, and one non-combatant. The Staff consists of one Commanding Officer only, generally of the rank of Lieut.-Colonel, but sometimes of Colonel.

(c.) *Independent Companies.*—These Companies have a much greater strength than those which compose the Battalions. Thus the two Companies of St. Petersburg have each of them 250 rank and file. Those which are in Asia have the same strength on the peace as on the war footing, viz., that of Vladivostok, 300 men; those of Tachkent and Samarcande, 200; and those of Viernyi and of Perovski, 150.

(d.) *Instruction Batteries.*—These two Batteries are, one of them a Field Battery with a strength of six officers, 181 combatants, seven non-combatants, five officer's horses, nine troop riding horses, and 37 Artillery draught horses; the other, a Horse Artillery Battery with a strength of five officers, 172 combatants, six non-combatants, four officer's horses, 100 troop riding horses, and 53 draught horses. The former Battery has four Light Field and two Mountain guns, the latter six guns.

The total strength of the territorial and local troops is 26,607, viz., 766 officers, three specialists, 25,499 combatants, and 309 non-combatants.

Grand Total Strength.

The total strength, as deduced from the above statements, of officers, men,

horses, and carriages, of the Artillery on the peace footing is 109,819 men, viz., 3,505 officers, 42 specialists, 99,724 combatants, 6,548 non-combatants; with 25,928 horses, 1740 guns and 148 wagons.

We shall now see the proportions, in which these totals enter into the formations which are created in time of war from the units organized in time of peace.

SECOND PART.—(THE WAR FOOTING).

I.—ORGANIZATION.

The passage from the peace to the war footing is, with the Russian Artillery, as with other European armies, a somewhat complicated operation. The new formations derived from those organized in peace time are numerous, and are here given in the order previously adopted.

(1.) *Active or Field Troops.*

The number of Heavy and Light Batteries which enter into the composition of the active troops is not changed, each of these units is simply raised to the strength indicated further on. The same thing takes place with the Field Mountain Batteries, except that each of the three Kiev Batteries form at the time of mobilization a second Battery, which raises the number to six; the three new Batteries take the numbers four, five, and six.

The regular Horse Artillery Batteries of the Guard and of the army are similarly not increased in number. But the Cossack Voïskues form a certain number of new Batteries. That of the Don furnishes 14, that of Orenbourg three, and that of the Transbaikal one.

With regard to the Field Parks, allusion has already been made in studying their organization in peace time, to the changes which they undergo in time of war. The method of these formations is here given more in detail.

By the terms of the Imperial Order, No. 131, of June, 1886, each Divisional Flying Park on the peace footing is changed on mobilization into a "Flying Brigade of Artillery Parks" composed of four Flying Parks, of which from 2 to 24 wagons carry Infantry ammunition, and from 2 to 48 wagons carry Artillery ammunition.

The number of these Flying Brigades is 48, they have the same number and designation as the Artillery Brigade to which they are attached. The Flying Parks, of which there are therefore 192, are numbered in each Brigade, and called "1st, 2nd, &c., Flying Park of the so-and-so Brigade of Flying Parks." The two first carry Infantry ammunition. Each Flying Park is sub-divided into two Demi-Parks, four troops and eight sections.

Behind this formation of Flying Parks, which form the first supply reserve, come the Moveable Parks.

These Parks are 56 in number, numbered from 1 to 56. They are distributed in the Corps d'Armée at the rate of one to every two divisions. In the present order of battle the Corps d'Armées which have only two Infantry Divisions are 10 in number; they would thus absorb 10 Moveable Parks. As for the nine Corps d'Armées with three Infantry Divisions, they have, according to the arrangements drawn up in concert by the War Minister and the Commander-in-Chief of the Field Army, either one or two Moveable Parks.

Some of these Moveable Parks act as Flying Parks for the Reserve Divisions. Of these Reserve Divisions which number 24, 12 are formed with troops of the first Reserve; these have two Moveable Parks each, and therefore absorb 24 of them. The other 12 Divisions, which are formed from the 2nd Reserve, have only one of these Parks attached to each Division. In all, the 24 Reserve Divisions should have 36 Moveable Parks. The Corps d'Armées with two Divisions having absorbed

10 of them, and the Reserve Divisions 36, 10 only remain for the nine Corps d'Armées with three Divisions and for the 24th Division, which is stationed in Finland, and does not belong to any Army Corps. It is probable, therefore, that the distribution of these Parks among the troops, as given above, is not always strictly followed.

The Local Parks, which are 84 in number, and of which the material only exists in peace time are, at the time of mobilization, distributed at the rate of one for every two Divisions which form part of the army, or of a detached Corps; one of them is also attached to every supernumerary Division; 64 are reserved for the active troops, and 20 for those of the Reserve. They are not sent to the seat of active operations except on a requisition made, when necessary, by the Artillery Commandant of the Army.

(2.) *Reserve Troops.*

The Reserve Batteries in peace time are only 30 in number, distributed in groups of six between five Brigades.

On mobilization, they are formed into 120 Batteries in the following manner:— In the 1st Brigade, the 1st Battery, which contains two heavy sections, furnishes four Heavy Batteries; the 2nd, 3rd, 4th, and 5th Batteries furnish 16 Light Batteries, and the 6th Battery, which has two sections (one Field and one Horse), furnishes four other Light Batteries, one of which has a Horse Artillery section. Altogether, for the 24 Batteries of the 1st Brigade, there are four Heavy and 20 Light Batteries, one of which has a Horse Artillery section. The 2nd and 3rd Reserve Brigades have the same composition as the 1st; and form the same number of Batteries similarly composed.

In the 4th and 5th Brigades, the 24 Batteries, which are formed from each of them, consist of four Heavy Batteries, 19 Light Batteries, one of which has a Horse Artillery Section, and one Mountain Battery, formed from each of the five Batteries of those two Brigades which have a Mountain Section in peace time.

To recapitulate, the 120 Batteries formed from the Reserve troops are divided into 20 Heavy Batteries, 98 Light Batteries and two Mountain Batteries. Out of these 120 Batteries, the 20 Heavy Batteries and 60 Light Batteries go to furnish the Artillery for the 24 Infantry Reserve Divisions formed at the time of mobilization. They are divided into 20 Brigades, 24 Batteries each. The distribution of the 40 remaining Batteries will be given under the following head:—

(3.) *Depôt Troops.*

The two Depôt Batteries kept up in peace time are each of them formed into four Batteries. The 40 Reserve Batteries remaining in addition to the 80 attached to Reserve Divisions may also be counted as Depôt Batteries. These 40 Depôt Batteries form five Brigades of eight Batteries each.

To recapitulate, the 48 Depôt Batteries are distributed in the following manner:—

					Light Field Batteries.	Do. with 1 H.A. Section.	Mountain Batteries.
1st Depôt Brigade has	...	...	...	...	7	1	—
2nd " " "	...	...	...	...	7	1	—
3rd " " "	...	...	...	...	7	1	—
4th " " "	...	...	...	...	6	1	1
5th " " "	...	...	...	...	6	1	1
Not Brigaded	...	...	...	...	7	1	—
					<hr/> 40	<hr/> 6	<hr/> 2

The Horse Sections form the Depôts of the Horse Artillery, to which must be

added, out of the Cossack troops, a Depôt Battery of four pieces furnished by the Voisko of the Don, and a battery of Orenburg Cossacks. The two Mountain Batteries form the Depôts for that description of battery.

(4). *Local Troops.*

(a) *Sortie Garrison Batteries.*—The five batteries on the peace footing are formed on mobilization into 16 batteries. The 1st Battery forms four batteries to be stationed in Varsovia; the 2nd forms four for Novo-Georgeievsk; the 3rd forms three for Brest-Litovski; the 4th forms two for Ivangorod, and the 5th forms three, which are attached to Kovno.

(b). *Garrison Battalions, Companies, and Detachments.*—These different units only increase their strength in the passage from the peace to the war footing, there is no new formation. The two Instruction Batteries are increased in the same way.

In accordance with this organization, the total number of batteries which the Russian Artillery can dispose of on the war footing is 525, made up of 118 Heavy Field Batteries, 311 Light Field Batteries, 69 Horse Artillery Batteries, and 27 Mountain Batteries. This includes the Cossack Artillery, the Sortie Garrison Artillery, and the Instruction Batteries.

II.—EFFECTIVE STRENGTH.

(A).—*Field and Horse Artillery.*

(a.) *Field Batteries.*—On the war footing all the Heavy Batteries stationed in Europe and on the Caucasus have the same strength, and the differences noted in the strength on the peace footing no longer exist.

They each comprise six officers, 237 combatants, 22 non-combatants, 5 officer's horses, 18 troop riding horses, 163 Artillery draught horses, 20 heavy carriage draught horses. They have eight guns, six wagons, and one spare limber, and also eight heavy carriages, five of which are for the Artillery train and three for that of the Commissariat. The two Heavy Batteries of the Turkestan Brigade form, on mobilization, a 5th Depôt Section which increases their strength by 46 combatants. This composition of their train is not yet fixed. This remark applies to all the troops of Turkestan and of the two Siberias.

(b.) *Light Batteries.*—All the batteries belonging to the Guard Brigades, to the Grenadiers and to the army, have the same war strength, viz., 6 officers, 205 combatants, 22 non-combatants, 5 officer's horses, 18 troop riding horses, 137 Artillery draught horses, and 20 heavy carriage draught horses, 8 guns, 12 wagons, and 1 spare limber.

The train has the same composition as that of the Heavy Batteries. The strength of the Light Batteries of Turkestan and of Eastern and Western Siberia differs slightly from the preceding. The Light Batteries of the Turkestan Brigade have in addition a 5th Depôt Section of 38 men. The 1st, 2nd, and 4th Batteries of the Siberian Brigade have 211 combatants instead of 205; and the two first have a 5th Depôt Section of 38 men.

Lastly, the two Light Batteries of Eastern Siberia have a peculiar composition, as their eight guns are four of them Light Field and four Mountain. Their strength is 6 officers, 211 combatants, 22 non-combatants, 5 officer's horses, 17 troop riding horses, and 67 draught horses, with 8 guns, 16 wagons, and 1 spare limber.

The composition of the train is not yet fixed.

(c.) *Horse Artillery Batteries.*—All the Horse Artillery Batteries of the Guard have the same strength in men and in horses, viz., 5 officers, 183 combatants, 28 non-combatants, 4 officer's horses, 99 troop riding horses, 123 Artillery draught horses, 27 heavy carriage horses. They have 6 guns, 12 wagons, and 1 spare limber, and 11 heavy carriages, of which 5 belong to the Artillery and 6 to the Commissariat.

The Horse Artillery Batteries of the army only differ from those of the Guard in the number of combatants and non-combatants. These are, respectively, 181 and 31 for 14 of the batteries, which have besides two specialists (Doctor and Veterinary Surgeon), and 180 and 28 for the nine other batteries.

With regard to the Cossack Batteries, all those which belong to the Voisko of the Don have the same strength, whatever may be their position on the roster for service. They have 6 officers, 238 combatants, 33 non-combatants, 6 officer's horses, 142 troop riding horses, 120 Artillery draught horses, and 27 heavy carriage draught horses. Their equipment is the same as that of the regular batteries.

It is to be noted that of the 238 combatants, 44 belong to a *Depôt Section* formed at the time of mobilization.

The battery which forms part of the Horse Artillery Brigade of the Guard has only 5 officers, 210 combatants (30 of whom form a reserve detachment to replace casualties), 31 non-combatants, 5 officer's horses, 129 troop riding horses, 133 Artillery draught horses, and 27 heavy carriage draught horses. Its equipment is the same as that of other batteries.

The Cossack Batteries of the Kouban, of the Terek, of the Transbaikal, and of Orenburg, have identically the same composition in each of these Voiskos, wherever they may be on the roster for service.

The five batteries of the Kouban and the two batteries of the Terek, have each of them 5 officers, 254 combatants (50 of whom form a *Depôt Section*), 36 non-combatants, 5 officer's horses, 155 troop riding horses, 143 Artillery and 27 heavy carriage draught horses. The equipment is the same as that of the other Horse Artillery Batteries. The odd-numbered batteries have, in addition to the above strength, two specialists (a Doctor and Veterinary Surgeon), four non-combatants, and six riding horses.

Those of the Cossacks of Orenburg have 5 officers, 1 specialist (Doctor), 234 combatants (54 of which belong to a *Depôt Section*), and 32 non-combatants. There are 6 officer's horses, 142 troop riding horses, 120 Artillery and 27 heavy carriage draught horses. The equipment is the same as that of all the Cossack Batteries.

Lastly, the three Horse Artillery Batteries of the Voisko, of the Transbaikal, have 5 officers, 1 specialist, 238 combatants (43 of whom form a *Depôt Section*), and 31 non-combatants.

Mountain Batteries.

The strength of these Batteries in men and horses varies considerably, in accordance with the difference in their equipments, as will be seen from the following table:—

	3-pr. Battery armed with bronze guns.	Batteries armed with steel guns of 2.5-in.	Battery of Turkistan on wheels.	Battery of Kiev.	Horse Artillery Batteries of Turkistan.	Horse Artillery Batteries of Western Siberia.
Officers	6	6	6	6	5	7
Combatants	233	233	155	223	137	208
Non-combatants	67	67	57	57	64	51
Horses. { Officers	5	5	5	5	4	6
{ Troop riding	3	3	3	3	82	110
{ Bât. or Artillery	114	133	55	128	57	84
{ Heavy carriage	(1)	(1)	(1)	(1)	(1)	(1)
Guns	8	8	8	8	6	8
Wagons	14	16	12	16	6	8
Spare limbers	1	1	1	1	1	1

(4) The establishment of the Mountain Batteries in heavy carriages is not yet definitely fixed.

(B.)—Parks.

(a.) *Flying Parks.*—The composition of the Flying Parks differs according to whether they carry Infantry or Artillery ammunition.

The first contains three officers (one of whom, a first or second Captain, commands the Park, whilst the two others are of the grade of Lieutenant and Sub-Lieutenant), 163 combatants, and 16 non-combatants. There are 4 officer's horses, 7 troop riding horses, 156 Artillery and 9 heavy carriage draught horses.

The carriages number 29, of which 24 are wagons with 6 horses, one an implement carriage with 4 horses, and 4 general service wagons with 2 horses.

The Artillery ammunition Flying Parks have a much greater strength, comprising 48 wagons, 2 implement carriages, and 7 general service wagons. They have each 4 officers, 300 combatants, 24 non-combatants, 5 officer's horses, 7 troop riding horses, 311 wagon horses, and 15 general service horses.

(b.) *Moveable Parks.*—The composition of the Moveable Parks is the same as that of the Artillery Flying Parks, except that there are two less non-combatants.

(c.) The Local Parks on the war footing have 50 combatants and 4 non-combatants. They are commanded by a Captain, who has a Lieutenant or Sub-Lieutenant under his orders.

We can now give the whole effective strength on the war footing of the Artillery entering into the composition of the active troops :—

	Officers.	Specialists.	Combatants.	Non-Combatants.	Total.	
A {	Field Artillery ...	1,716	—	62,078	6,292	68,370
	Mountain Artillery ...	138	—	5,221	1,471	6,692
	Horse Artillery ...	140	28	5,069	826	5,895
	Cossack Batteries...	223	17	9,449	1,392	10,841
Total		2,217	45	81,817	9,981	91,798
B Parks... ..		896	—	61,248	4,272	65,520
Grand total ...		3,113	45	143,065	14,253	157,318

The total number of horses is 143,751, with 2,882 guns, 14,476 wagons, and 5,059 heavy carriages.

Thus, in round numbers, the batteries belonging to the Field troops are commanded by 2,200 officers, and served by 91,000 men. They require 75,500 horses, are armed with 2882 guns, supplied by 2,874 wagons marching with the batteries, and by 9,600 wagons forming the Parks.

The total number of horsed carriages amounts to 10,069 for the 595 batteries, to 11,448 for the Parks, and to 22,417 for the whole of the elements which compose the Artillery of the Field troops.

Reserve Troops.

Only 80 out of the 120 batteries formed at the time of mobilization from the 5 Reserve Brigades on the peace footing are included under this head; the 40 other batteries are counted among the Dépôt troops. Of these 80 batteries, 20 are Heavy and 60 Light. They are composed in the same way as the Active Batteries of the same nature.

The total strength of 80 batteries is 18,280, viz., officers, 480; combatants, 17,040; non-combatants, 1,760; with 14,920 horses, 640 guns, 1,040 wagons, and 720 heavy carriages.

(3.) *Depôt Troops.*

The Depôt troops formed at the time of mobilization came, as has been said, from two different sources, the first 40 came from the 5th and 8th Batteries of the 5th Reserve Brigades on the peace footing; the others, eight in number, from the two Depôt Batteries.

If we enter into detail, we see that:—

1. The three No. 5 Batteries of the three first Reserve Brigades give 12 Light Batteries.
2. The two No. 5 Batteries of the two last brigades give six Light Batteries and two Mountain Batteries.
3. Lastly, the five No. 6 Batteries of the 5th Brigades furnish 15 Light Batteries, and five Light Batteries, with a Horse Artillery Section each.

Of the eight batteries formed from the two Depôt Batteries, seven are Light Batteries, and one a Light Battery with one Horse Artillery Section.

The establishment in men of these different units is divided into two parts, the one permanent, the other variable and intended to cover the losses sustained by the active or Reserve Batteries.

In the same way, one part of the carriages belonging to these batteries is horsed, the other is not.

The total strength of these batteries is from 600 to 900 men, the permanent part varying from 100 to 150, with from 10 to 14 officers.

The Depôt Battery formed from the Cossack troops of the Don contains six officers, two specialists, 88 combatants, and 12 non-combatants, with four guns and one wagon. That of the Orenburg Cossacks has three officers, 48 combatants, three non-combatants, with four guns.

The total strength of the Depôt Batteries is 513 officers, two specialists, and 30,985 men, with 2,675 horses, 404 guns, and 107 wagons.

4. *Local Troops.*

The 16 Garrison Sortie Batteries have eight guns and two wagons horsed in time of war. Their strength in *personnel* is six officers, 122 combatants, and eight non-combatants; in horses, five officer's horses, eight troop horses, 56 Artillery and four heavy carriage draught horses.

Of the two Instruction Batteries, which we have included in the Local troops, one has the strength of the Light Batteries, and the other that of the Horse Artillery Batteries.

The companies of Garrison Artillery increase their strength of officers by two at the time of mobilization; thus making five. The number of combatants is raised to 327, that of non-combatants is always one.

Of the independent companies, those of Vladivostok, Tachkent, Samarcande, Viernyi, and Perovski, have the same strength as in time of peace; the two companies of St. Petersburg, only, increase theirs by 150 men each; numbering accordingly, five officers, 442 combatants, and two non-combatants.

There is no change in the composition of the detachments of Odessa, Nicolaievsk, and Askhabad. The total strength of the Artillery of the Local troops amounts to 1,211 officers, three specialists, 70,683 combatants, and 404 non-combatants, with 1,601 horses, 142 guns, 56 wagons, and 21 heavy carriages.

We can now give, in the following table, the grand total strength of the Russian Artillery:—

	Horses.					Carriages.							
	Officers.	Specialists.	Combatants.	Non-Combatants.	Total of Columns, 3 and 4.	Officers.	Troops.	Artillery.	Heavy Carriages.	Total of Columns, 6, 7, 8, and 9.	Guns.	Wagons.	Heavy Carriages.
	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Troops ...	3113	45	143,065	14,253	157,318	3039	15,405	114,861	10,446	143,751	2,882	14,476	5,059
Reserve Troops ...	480	—	17,940	1,760	17,800	400	1,440	11,480	1,600	14,910	640	1,040	720
Depôt Troops ...	513	2	80,816	669	30,985	465	690	1,418	102	2,675	404	107	—
Local Troops ...	1211	3	70,683	404	71,087	89	245	1,156	111	1,601	142	56	21
	5317	50	261,104	17,086	278,190	3993	17,780	128,915	12,259	162,947	4,068	15,679	5,800

In round numbers, 5,400 officers and specialists, 278,000 men, 163,000 horses, and 25,500 carriages, of which nearly 5,000 are guns.

If we compare these numbers with those of the peace strength, it is seen that the transition from the peace to the war footing, and the new formations created on mobilization, require 1,820 officers and specialists, 171,918 men, 137,019 horses; and that the equipment is increased by 2,321 guns, 15,531 wagons, and 5,800 carriages.

WICKSBURG, BEEKLEY,

22nd March, 1888.

ON ARMING THE GUN DETACHMENTS OF FIELD ARTILLERY.

From the "Militär Wochenblatt."

TRANSLATED BY

CAPTAIN E. S. MAY, RA.

WE have heard little lately (more's the pity!) of the arming of the detachments of Field Artillery, and yet the question is a matter of the highest importance.

The object of the following paragraphs is simply to invite discussion and a friendly interchange of opinion on the subject.

The detachments of Field Artillery are unfortunately now armed with a sword bayonet, a weapon almost as useless in a hand-to-hand combat as it is inconvenient to the wearer when he wishes to sit on the limber. In a hostile country, or amongst an insurgent populace, the field gunner, whether on the line of march or in his quarters, may be said to be absolutely defenceless.

During the campaign of 1870 therefore, necessity obliged almost all Commanding Officers to arm the night sentries over their gun parks with a pistol borrowed for the occasion from one of their drivers, not with the idea of giving a weapon of defence to the sentry, (for field gunners were then, as now, quite uninstructed in the use of pistol or revolver), but to enable him to give the alarm by its discharge. Now-a-days too one might put a revolver in a sentry's hand, but it would have to be borrowed from a mounted man, and the gunner would be as uninstructed in its use as heretofore.

On the line of march, or when passing through wooded defiles and such like places, the guns must be protected by an escort of either Cavalry or Infantry, otherwise a handful of enterprising sharpshooters may with a few rifles hold several hundreds of brave and able gunners of a Field Artillery Division on the line of march in check.

No battery can venture to encamp by itself in any hostile territory, but must perforce be guarded by the already hardworked infantry, which are called to its protection on such occasions. The foot artillery have been armed with a rifle, yet it is still withheld from the field batteries. What is the reason of this?

It is argued that if a field artilleryman be armed with a rifle he will leave the service of his gun, when the enemy are storming the battery, and will seek to defend himself with it. There is absolutely no ground for this assertion, nor is it likely that while the gunners can still work their gun they will leave it for a far less efficient weapon.

But if the enemy are actually in the battery, when their cavalry surges back, having charged through the intervals between the guns, there is a moment when well directed musketry may not only be turned to good account by the gunners, but may even, under certain circumstances, be the means of saving a battery that might otherwise be lost.

The chief use however of a fire-arm would be on the line of march or in camp, and it was no mere fancy, but because they found them of great service in those troublous days, that made the batteries that took part in the engagements round Orleans arm themselves with Chassepôts. Another argument against giving field artillery a carbine is that their training would thus be rendered

additionally troublesome. But the introduction of a carbine would have precisely the opposite effect. It would *simplify* their training, and for this reason that then the utterly useless, and most tedious sword bayonet exercise would be abolished.

Now-a-days every field artilleryman, who is not mounted, has first of all to be put through the sword bayonet exercise, then, if he becomes a driver, he is taught sword exercise, and the use of the revolver.

But, if a carbine were introduced, he would be at first taught its use, and then, if he became a driver, he would only have to learn the sword exercise. Of course, much drill exercise with the carbine would be avoided. There would be plenty of time for practice with it in the afternoons between "aiming drill," and

that the cavalry have no time to go into such details with every man. But the system of instruction which the infantry have adopted leads to a real saving of time, since it attains its object more quickly. Just as when training a horse you may easily injure him, by going on too fast, so that it eventually becomes necessary to lose more time in order that he may recover from the injury; just as if the training of a horse be hurried, the progress made is really slower; so also is it with the bodily training of the men, which is hastened by attention to the individual nature of each and by demanding very little at the beginning. It is of the greatest importance to save time and strength in the training of cavalry recruits. Otherwise the unhappy fellows will suffer terribly owing to want of habit in riding, while the amount of things they have to learn, especially since reconnaissance and musketry have increased in importance, is so large, that anything which tends to save time and trouble is of the highest value. Moreover, to my great astonishment, the cavalry regulations for dismounted drill still contain some intricacies, which the infantry have long given up as useless, while they cause the soldier objectless trouble. I will mention of these only the order "half-right-turn" (or left), and the "right (or left) about three-quarters-turn."

I think that the dismounted training of the cavalry should be as systematic, and should be based on as good grounds as possible; but I would add that I ask only that the soldier should be sufficiently instructed to be able to march with the regiment in a soldier-like manner on any necessary occasion, for example, when he goes to church or on any special parade. If he is taught to march in the ranks, either in sections or in fours, and knows the formations required for this, that will be quite enough. Anything more than this will only do harm.

Another branch of the instruction of recruits is the theoretical course. This is not everywhere carried on in a manner calculated to produce the best results. What I have to say about this applies to all the courses, those for the recruits, as well as those for the older men and the N.C. officers. It is so easy to take a text-book in one's hand, to read out of it, and to drum it (as is vulgarly said), into the men by examinations. When an instructor proposes to do his best, he arranges the text-book in questions and answers, which may be learnt by heart by his class. The unfortunate soldiers are thus taught to answer mechanically, suffering terribly all the time and with their eyes half out of their heads, but without thinking in the least of what they are saying; and I have the very greatest sympathy with the soldier who to the question: "What is theoretical instruction?" answered: "A kind of instruction which is not practical." I have only in exceptional cases come across a system of instruction which was easily intelligible to the men, and of which the principles were practically applied before their eyes. And yet this might as a rule be easily managed. For instance, let the instructor, when he commences to teach the duties of reconnaissance or outposts, send out his men as patrols across the barracks or into the streets which lie close to them, and the recruits will understand at once what is the meaning of the word "patrol," and can then think about their duties. These squadrons which carried on their instruction in this manner have always been, in the succeeding summer, the best at the manoeuvres in reconnaissance and outpost work.

If we follow the course of training, we find that in December the recruits are inspected riding on a horse-cloth. I have no remark to make about this; it is carried on as well as possible in principle, and I should not wish anything changed.

In the course of the month of February the officer commanding the regiment as a rule inspects the remounts ridden on the snaffle. A great importance is rightly attributed to this inspection, since the handiness of the horses can be best tested on the snaffle. Great as has always been my admiration for Baucher's success in the circus, I have never been able to approve of his system, which set aside the snaffle altogether and trained a horse from the first on the curb. Every Prussian cavalry officer will agree with me on this point. But our horses must eventually be always ridden on the curb, and they are ridden on the snaffle only provisionally, as a means to an end, and not at all with the idea that this can complete their training. For this reason I have found it advisable not to select the end of their training for this inspection, and not to consider it, like the other inspections, as a touchstone and criterion of the efficiency of the instructors and instructed; it is better that the officer commanding the regiment should hold it a fortnight or three weeks before the horses are to be first ridden on the curb. He can then, out of his larger and more extended experience, assist the officer commanding the squadron and the instructors with advice as to how such and such a horse should be treated, &c., before he is ridden on the curb. For this reason it was found convenient not to fix any particular day for the whole regiment, or the whole squadron, to commence to ride the horses of any named class on the curb. Some horses may be the better for being ridden for a week longer on the snaffle, &c.; and the more perfect is the training on the snaffle the more easily will the horse work on the curb.

The inspection on the snaffle must not, therefore, be considered as the close of a distinct period in the training of the horses, but rather as a means of controlling the mode of instruction, and of directing it in good time in the right way, if, by any chance, it has been indifferently begun.

I cannot leave this subject of the winter instruction in riding, without saying a few words with regard to those rules in the new riding regulations which differ from the old ones, which have been in force for the last 60 years.

Many people have been astonished that the old division of classes has been changed, and that, instead of being divided into recruits and two classes of old soldiers, the recruits are now placed in the first class, and the whole of the old soldiers, including the N.C. officers, in another single class, the second. Many people, with the usual liking for what is old and a matter of habit, fear lest this change may result in the standard of good horsemanship being lowered. I do not share in any such presentiment. A good cavalry officer will be able to make better use of the new regulations than he could of the old, and these regulations are drawn up for good officers, that is to say, for the instructors.

For example, the preface of the new riding regulations gives plenty of latitude to the officer commanding a squadron. He can order riders of the 2nd class, who, for any reason, have been backward in their instruction during their first year of service, to join the recruits of the following year. A wise captain will so treat all those men who would formerly have been placed in the lowest division of the 1st class of old soldiers. There will thus be in future one more division of recruits than there used to be.

When the old soldiers were divided into two classes, the officer commanding a squadron was frequently puzzled, when the men of his

squadron could all ride well, how to determine whom he would take into the upper class, and whom of the really good riders he would be compelled to leave for yet another year in the lower. He sometimes got over this difficulty by breaking through the regulations, and by selecting a "best" division out of the three in the lower class; this bore the name of the 1st (the lower) class, but shared in the instruction of the second, and was inspected with it. This division was called "1st riding class trained up to the 2nd." The officer commanding a squadron can now classify all his old soldiers, who (with the exception of those who are put back to the recruits), are in the upper class, into different divisions according to their riding and general efficiency, and can arrange the various degrees of instruction to be given to each of these divisions; for the regulations are silent with regard to the amount of instruction which the upper class must have received before the inspection. The greater elasticity of the new regulations, as compared with the old, also allows him to form a division in the present upper class, composed of the best riders mounted on such horses as require further training (the most backward horses can be sent to join the remounts), while the inferior riders of the upper class can be told off to the better trained horses; thus the divisions of the class can be made homogeneous. A squadron had formerly, omitting the young remounts, nine divisions, as follows: three divisions of the 2nd class (one of old remounts, one of N.C. officers, and one of privates); three of the 1st class, of which one was "trained up to the 2nd," while the worst was even worse than the recruits; and three divisions of recruits. Of the nine divisions five are now in the 2nd class, and consist of one of old remounts and four others which are ranked as A, B, C and D, according to their riding; four are in the 1st class, of which the first is composed of old soldiers who have been put back to ride with the recruits. The great advantage of the present arrangement is, that the officer commanding a squadron will no longer be tempted, as he used sometimes to be, to put the worst horses and the worst riders into the lowest division of the lower class, where less attention was paid to them, while their miserable performances were at an inspection counterbalanced by the excellent efficiency of the other division; he now places the most awkward old horses with the best riders into Division A. of the upper class, in order that they may receive a further training, and the men consider it a feather in their cap to belong to the A. Division. The riding of the squadron as a whole gains by this, and the degree of perfection is more uniform. And uniformity in the standard of instruction of the individual troopers is the basis of correct movement in a squadron at drill.

The new riding regulations allow N.C. officers to join the officers' class, which is a novelty. This regulation has not been everywhere very well received, and I do not doubt but that many regiments will make no use of the permission. I have nothing to say against it, for I can see no danger to discipline in the fact that certain exceedingly good riders among the N.C. officers are allowed to ride in the same class as the officers; for skill in riding is the consequence of physical dexterity, and it is no disgrace to a young officer if a N.C. officer, who has served for a long time, should show such skill in a greater degree than he can, especially considering that he does so only in an enclosed riding-school. The "other qualities," which the riding regulations lay down as necessary for these N.C. officers in addition to special skill in riding, include sufficient tact not to swagger because they ride better than such or such an officer, and to keep silence

with regard to any fault which may be found with any one of the officers.

I am especially pleased with the conclusion of the preface of the new regulations, which says: "the instructions which are laid down exclusively for the third class are in no case to be practised by whole divisions."

There is certainly much temptation to an exceptionally good cavalry officer to carry out this higher instruction with his class as a whole. We used to see whole divisions do volts and bends at the short trot, and change the lead at the gallop at the word of command; while in order to carry out these movements some, if not most, of the less handy horses were so roughly used, that their joints and sinews ran great risk of injury, or at least were needlessly tried. The wording of this prohibition is such, that it permits the most skilled riders on the best trained horses to practice such exercises, when they are schooling their horses and riding alone. This tends to keep up a love of riding as an art, and should therefore not be altogether given up. But it has no real military value, and should therefore be reduced to a minimum, for all such performances are only proofs of the mastery of the rider over his horse, and are unnatural movements, carried out at the expense of the horse's power. The best riders and horses will have plenty of opportunities for them in individual practice, which, thank God, is carried out in our cavalry with special care, for it is founded on the principle that no horseman can ride properly in the ranks at drill, unless he can when riding alone make his horse obey his will under all circumstances.

On the other hand, I have seen certain practices, which appeared to be only amusing and mere pastimes, but which I can recommend as a means to the end. In the division which I commanded there was a squadron, of which all the men, when they had extended for sword exercise, stood up in their saddles and did gymnastic exercises or delivered cuts with their swords. In this same squadron all the men were taught (with the exception of the recruits and the men mounted on young horses), to spring into and out of their saddles when circling at the gallop, and further to jump off their horses just before reaching the bar (a low one it is true), and to leap on again as the horse jumped. Moreover the squadron finally deployed each division in the school, after which the men left their horses, then ran up to them again, crept under them, and leaped into the saddle from either side; this was done with all but the exceptionally skittish horses. This species of exercise has a special value, for it is only possible when the horses have full confidence in their riders, while this shows that they have been well and kindly treated. Since this squadron was, in all respects, fully the equal of any of the others, and had thus neglected nothing, I can fully recommend this performance as very useful.

I think that I have said enough to-day about the details of the cavalry, and I also fancy that, knowing the interest that everyone who is a cavalry man by profession must take in the training of horses, it is not necessary for me to say more. For I have indeed learnt by experience that one has only to ask such men for anything in order to obtain it at once; if I were, therefore, to write out a system of instruction it would be merely carrying owls to Athens. I will say no more to-day, but will, in my next letter, deal with drills and exercises,

14th Letter.

THE DRILLS AND EXERCISES OF THE SQUADRON.

WHEN I consider cavalry drills, the time of year in which they take place appears to me to be a matter of such importance, that I cannot avoid beginning with it. In former years the cavalry of the Guard at Berlin were inspected in the middle of May, having been prepared for the inspection before that date. The squadrons had therefore to commence their drills at the beginning of April, and had thus to carry them through in what was, considering all that they had to do, the exceedingly short space of three weeks. The result of this was that many points were only superficially studied, while nothing was thoroughly learnt. But the worst result of all was, that one of the periods in the year which entailed the hardest work, namely the time of the training of the squadrons and regiments, exactly coincided with the season when the horses were changing their coats, and were therefore out of condition and easily injured. In consequence of this the inspection of the cavalry regiments in Berlin was, at the beginning of 1860, postponed until the middle of June. Under this system the squadrons had to finish their instruction soon after the middle of May, and to be then prepared for the inspection. The special conditions which exist at Berlin made it impossible to place the termination of the spring training at a later date, since in the capital it is necessary to be able to exhibit as early as possible the capabilities of the Guard in time of peace, for it may very probably happen that their parade before foreign sovereigns or their representatives may, according to whether it be good or indifferent, exercise a greater influence on the course of politics than many a fight in war.

The greater part of our cavalry has been accustomed to consider the customary system of instruction of the Guard simply as following the will of the king, and have on that account generally imitated it, and have thus fixed the end of the squadron exercises at the middle of May. But there was really no other cause for this arrangement. Moreover the Guard has a second drill season in the summer, for the special reason that it is impossible to practice everything thoroughly in the spring.

I thus found, when I took over the command of the 12th division, that the squadrons were generally inspected at the end of their training, on some date after the 15th of May. The general commanding had at that time issued a very excellent order that each body of troops was to be inspected only once in each period of instruction. This order very much quickened the training, since the inspections thus took no more than the absolutely necessary time from the period allowed for instruction. The various inspecting officers had by this plan to agree between themselves as to the day of inspection. I and the brigadier consequently were present at the inspection of the squadrons by the officer commanding the regiment.

At the first of these inspections, on the 15th of May, and the following days, I noticed that the period available for squadron drill coincided, in Upper Silesia (where the winter lasts longer than in Berlin), with the most changeable spring weather, so that sometimes several warm days made the horses begin to shed their coats, while these again would be suddenly interrupted by snowstorms on the following days. This made the horses sick, so that they needed special care just at the moment when a great strain was brought upon them by the exercises. This was a distinct contradiction. The consequence was that either the horses were severely tried, or the squadrons were not properly trained. I therefore fixed the inspection of the squadrons for the following year, for the second half of June, it being understood that the last squadron was to be inspected, at the latest, by the last day of that month. I remember still the look of gratitude with which the officers commanding squadrons, who were deeply interested in the welfare of their horses, received my order.

The success of this plan was in the following year so complete, that I continued the order for the future. In the first place the squadrons could work at instruction in detail up to the end of April. Every experienced cavalry officer will feel with me how important it is, for good riding in the open, that the whole month of April should be available to put the final touches to the training in the school. For every cavalry officer knows how much less a well-broken horse suffers from the excitement, the vicissitudes and the exertions which are inevitable during the drills, than does one of which the training is as yet incomplete.

The officers commanding regiments thus made their final inspection of the training in detail at the end of April or the beginning of May. The following fortnight could then be employed, either by passing on at once to troop and section drill, or in making good, especially in the case of young or backward horses, such defects in training as the officer commanding the regiment had noticed at the inspection as calling for improvement. The officers commanding squadrons had thus time and opportunity to carry out, during the current year, any wishes expressed by the commanding officer.

The squadron drills began in the month of May, just at the time when they would in former days have finished. It was thus possible to defer the beginning of the drills for a few days, if any exceptional weather had delayed the horses in changing their coats; while nearly six weeks were available for instruction.

Many old commanders of squadrons, who have been accustomed to a short and hurried period for drills, will perhaps tell me that this is too much, and that no advantage is gained by drilling too long and too often, that after a time the mind gets weary, and that no improvement is made at the last. But it is possible to get over this. The main point is that the horse, which is even more an animal of habit than a man, should be gradually accustomed to the exertion of drill. It is only by means of a lengthened period of drill following their previous training (during which the distance trotted or galloped has been gradually increased, and thus the whole squadron has been brought into condition), that it is possible to get the horses into such good wind, that at last they will be able, when called upon, to trot and gallop four miles and then charge, without being in any way injured and even without being blown. The fat about the lungs must be gradually got rid of. If this be done too quickly pneumonia will result. The riders also must be gradually accustomed to long trots and gallops. They must learn not only to make them, but also not to be

excited by them. The young recruit must be gradually accustomed to take a sharp gallop at drill, with the noise of the rushing horses around him, the masses of mud which they throw up and the brisk wind in his face, as a matter of course ; he must grow to take a pleasure in it, to feel quite at home in it, and to keep his eyes and ears open for the signals and orders of his leader, and must learn not to be tired with the movement, but to thoroughly enjoy it. A rider who feels thus incommodes his horse very little, and does not tire him like a rider who is uncomfortable in the saddle, and therefore clings on with a heavy hand, using the aids falsely.

If the squadron be wisely handled the exertions demanded from it will be gradually increased as the drill goes on, so that finally all that is wanted can be done without injuring the horses.

I have already said that I have seen all that I have described thoroughly carried out without the horses being blown. The horses were moreover in good fettle, though free from unnecessary fat, and were firm, full of muscle and in hard condition.

In order to prevent wearying the spirits of the officers and men during the period of six weeks that the squadron drills last, and also in order not to lose any of the time needed for the other branches of instruction, I ordered that the first principles of field service should have been taught, and that the target practice should be well advanced by the end of June, so that both these courses of instruction should be completed during the month of July. These two courses can be perfectly well carried out simultaneously with the squadron drills. Moreover it is advisable, if you want to get horses into condition, to take them every day into the open air, and not to allow them to remain in their stables for one or two days in the week in addition to Sunday.

Their health requires daily exercise. With this object it was our custom to drill the squadron three or four times in the week. As we moved out to, or in from, the drills, each unit marched in war formation, with an advanced guard, scouts and reconnoitring patrols, and thus practically taught the young soldiers the necessary principles and formations. Once a week we practised field service which, if it was considered necessary to spare the horses, was carried out in drill order at a walk or a slow trot. We practised with carbines once or twice in the week, riding at a walk to the practice ground, which gave the horses the needful exercise. On the days when we drilled elementary riding-drill was also always carried on in the manéges, not by sections, which would have entailed a mixture of men and horses of various capacities, but by classes ; these were then remounts, 2nd and 1st class, and recruits. Thus variety of exercises obviated any tendency to weariness.

In a similar manner the inspection which took place at the end of the squadron drills extended simultaneously over many branches, including the elementary exercises, manœuvres by signal, manœuvres in action, the elements of field service, riding by classes in the manège and single combats, while, after the squadron had been broken off, the young remounts were inspected in the school. Of course it was impossible to properly inspect so many branches of training without a considerable expenditure of time, and many cavalry officers who are not accustomed to this system will be horrified to hear that the inspection of a single squadron often lasted from four to five hours. But when two squadrons were collected in one garrison and could thus be inspected together, it lasted from six to seven hours. It may be thought that this must injure the horses, but it was not found to be the case, provided that the inspection was carefully

arranged so as not to put too great a strain upon them, and if, what was the most important point of all, the squadron had brought their horses into good condition by the system which has been given above.

The real way to spare the horses at an inspection, is not to compel them to stand waiting in parade formation on the drill-ground. This waiting in parade order tires horses terribly. If the inspecting officer, as cannot sometimes be avoided even with the best will in the world, should be unexpectedly delayed, it is very possible that the squadrons, which would rather be a quarter-of-an-hour too early than half a minute too late, may be kept waiting a good half hour under the strain of the parade formation. This is a great exertion and very tiring, and the general result is, that the horses weary of standing move a little backwards and forwards, do not stand up to the bit, and thus the dressing, which may originally have been excellent, is lost. The commander, who has carefully dressed his ranks, gives the order to salute as the inspecting officer draws near, and is then, when he rides to the flank, as much astonished as the general at the appearance of his squadron, which has in the mean time entirely lost its dressing. I have known a case, where a body of cavalry, which I knew to be perfectly drilled, thus excited at the very beginning the impatience of the inspecting officer; it then marched past at a walk, during which the horses, who were tired of waiting, fidgetted about in and out like the teeth of a saw, and produced a very bad impression on the inspector. If you want to see what a squadron really is, and not merely what it may by accident appear to be, you should order the men and horses to be in their stables ready to turn out; when the inspecting officer arrives he will see them turn out, and can watch them as they are told off; and should then wait until the officer commanding reports that the squadron is ready in the stable yard. In this manner the mode of carrying out the interior duties of the squadron may be judged, so far at least as they are connected with the parade. When the squadron is ready, the men and their equipments can be fully inspected. If then the squadron be ordered to march to its drill-ground carrying out on the way some simple tactical idea, two points are gained; the time taken by the march to the drill-ground is shortened, and the squadron can on the way be tested as to its efficiency in the elements of field service. It moves forward at a trot, and attacks a supposed or a skeleton enemy. If two squadrons are inspected at the same time, one of them can be sent on to the ground, while the other follows it, and thus it can be arranged that they shall charge each other when they are both on the exercise ground.

This was followed as a rule by the elementary exercises, which, when two squadrons were being inspected, were done first by one and then by the other, while the squadron which was not drilling dismounted and rested. The parade and the march past took place, if thought desirable, during the elementary exercises. In order to give time to the horses this was followed by the sword-exercise. This really did ease them, as it was carried out one class at a time, while the others rested. And moreover only two or three men of each class were inspected at a time, while the others stood at ease. After this followed fighting-drill, and whatever else the inspecting officer wished to see; for example, movements at the gallop, post-practice, &c. The squadrons then returned to their garrison at a quick pace, carrying out as they went some tactical idea by way of practising their field service. If such an inspection as this lasted from four to six hours, it could not distress the horses, for each horse rested several times between the exercises, their riders being dismounted for at

least half the time. And in the warm days of June it matters nothing whether a horse rests in his stable or in the open air. The higher the rank of the inspecting officer, the more probable it is that he will not be able to give so much time to each squadron as would be necessary for such an inspection. I cannot omit to remark that my then commanding general, who was himself a red-hot cavalry soldier, was very fond of being present at this kind of inspection, and, when he had not sufficient time to see all, preferred to see only a part of the squadron, rather than that the inspection of that part at least should not be thorough.

Allow me now to enter into some details with regard to points in the drills of single squadrons which I have noticed as being specially worthy of remark.

I spoke above about "drill by signals." Para. 110 of the regulations of the 5th of July, 1876, permits this to be carried out. But before this regulation appeared one officer commanding a squadron had practised his troops not only, as this para. lays down, to advance, to halt, and to change direction according to signals made with the sword, but also to perform most of the movements possible in sections, such as wheeling into column or half-column, advancing after the wheel, changing front or direction, and changes of pace; this last was done by a simple order, that the squadron was to conform to the pace at which he rode. Soon afterwards the other commanders of squadrons in the division did the same, and the officer commanding the brigade, in order to introduce uniformity into these practices and signals, enquired as to the system which had been most successful, and made this a regulation for all the squadrons. It is true that he went farther than para. 110 prescribes, and permitted some things, which the regulation has forbidden. But the result was so excellent, that I said nothing against his system. From that time the squadron-leaders moved their squadrons all over the drill-ground in every formation and at all paces without a single word of command. It looked very strange to see a squadron, without a trumpet-call or a word of command, sweep silently over the plain. When the ground was soft, so that the tramp of the horses could not be heard, the cavalry gave one the impression of ghosts obeying the orders of an invisible spirit, and one thought at once how easily they might surprise an enemy from the flank or the rear. But the true value of this system did not, in my eyes lie only in the fact that it was thus possible to skilfully lead a squadron in the midst of the noise of the movement of a large mass of cavalry; it seemed to me rather the means to an end. The habit of watching for a signal from the sword of their leader accustomed the troops to an increased attention to the actions of their officers, while the latter learned to keep their eyes fixed on their chief. The silence of the officer commanding the squadron was infectious, and consequently there was not any talking in the squadron, a fault to which the men get quickly accustomed, not from want of discipline, but out of good-will to each other, to help their comrades and to prevent mistakes. It is indeed perfectly true, that drill by signals with the sword works more correctly, and more quietly than by word of command, and when the former had once been learnt, it improved both systems of drill, giving greater exactness in leading and better discipline at drill.

The same para. of the regulations directs that the squadron is to be practised in charging on given points. With regard to this, when I was in command of a division, I discovered a most curious thing, namely, that if this charging upon some special object is not assiduously practised,

it is most difficult to hit it off exactly. When I directed the officers commanding squadrons to charge directly upon me, wherever I happened to be, and to strike me with the centre of their squadrons, scarcely one of them could do it. As a rule the squadrons shot by me, and they found it even more difficult to ride at me when I was in motion, even at a walk. They then it is true, dressed by the right. They now thank God, dress by the centre, and the squadron-leader gives a line to the section of direction, so that the men have only to follow the directing officer, from whom the directing file has to keep its interval; this is far easier. But the charge must be constantly practised, more especially against objects in motion which it is desired to attack. For the most important thing of all is that the squadron shall charge the exact point which has been selected. What is the use of any cavalry training if you charge a friend instead of an enemy? I had often heard it spoken of as a fault (before I had had cavalry under my command), that the leaders could not "seize the object of the charge," but no one ever taught the unfortunate and much abused commanders of squadrons how they were to do it, and they never had any opportunity of learning. Even when the troops dress by the centre practice beforehand is, as I have said before, sorely needed, especially when the charge is made on a moving object such as may always present itself, especially in a combat which sways backwards and forwards. For if the squadron leader is riding as hard as he can, and turns to follow a moving object, the inner wing will be crowded up, owing to his change of direction, while the outer will break up into a loose swarm. He must therefore take up his new line at a moderate pace, in order that the outer wing may wheel and overtake him, while the inner slackens its pace. Unless this be done the charge will always be loose.

And those loose charges! What complaints we have heard of them and how often have people written that the charges are too loose, and that they ought only to be attempted knee to knee! But, my honoured comrades of all arms, all these complaints and these writings are of no use, if you only shout out blame and do not go to first principles, and say why the charges are loose, and how this disadvantage is to be overcome! The regulations describe exactly how a charge is to be made over the open drill-ground. We are now ordered to practise a charge on a moving object. But even this is not sufficient.

When a body of troops had overcome with success all the difficulties which affect a charge in close order, when it had carried out a charge in the closest possible order on the drill-ground, when it had even practised charging a moving object, even then it somehow happened that these troops at the manœuvres arrived in disorder at the spot where they ought to have looked like a wall. Everyone then blamed them, criticised them and abused them, and called their fault "quite incredible" and "unheard of," but no one told the roughly-handled leader how, where and when he had committed his fault. The result was easy to see, and the expressions "a mere swarm," "a horde," "a rabble," were quickly spoken. But where was the fault? How was it to be avoided in the future? I never heard these questions answered.

And yet the error was so easy to see, and so excusable, that a word of friendly advice or a simple remark would certainly have done more to remedy it than the very strongest abuse. For at the manœuvres and in war it very rarely happens that a cavalry charge advances over the whole distance in a straight line, as it does on the drill-ground. Most charges

immediately succeed a movement to a flank, either by the wheel of the squadron or by forming line from column of sections; directly after which comes the order to charge. Most squadron leaders, being eager and hot to fight, keep their eyes directed solely on the enemy, and swinging their swords give the command "Charge!" immediately after the movement has been completed, not looking at their men to see whether it has been properly carried out. If this has not been the case, and if the outer flank has not been able to complete the wheel, then the charge must be loose, even practically in open order, since the pivot will be too far in advance if it starts too soon to charge. This fault is most common with keen officers who love fighting, since they burn to rush on ahead of their men and to throw themselves upon the enemy. But they must be taught to see that such extreme hurry endangers the very success which they are desirous and eager to obtain, and that one look, a mere glance, at their squadron must precede the order "charge;" Anyone who understands the cause of this evil will recognize that it may be more easily cured by a kindly word than by blame and reproaches, for it springs from an excess of zeal and a longing for action and not from carelessness or indolence.

With respect to the last point of the detail of instruction which I shall mention, I am afraid that my opinion will be opposed to that of the majority of cavalry officers. I mean with regard to the so-called *small* squadron drills. Many senior officers of cavalry are strongly of opinion that these should be carried out at every pace with the very greatest precision. The squadron rides to the large manège in file right in front, then forms sections, and then half sections, wheels to the right about, re-forms sections, advances by files left in front, forms line and has to stand like a wall. On every drill day the squadron goes through this exercise for half-an-hour or an hour. During the whole movement there must be no pause or any confusion; if there be, someone gets into trouble. When I, with the innocence of an outsider, asked: "What is the use of all this?" I was told that it was absolutely necessary, in order to prevent any delay or crowding in the case where a squadron marching on a wide front might have to pass a narrow defile. But in war I have never seen cavalry march in any other formation than sections, and no squadron leader to whom I have spoken on the subject has ever made any use of these drills. And yet what an enormous amount of trouble, effort and time is expended, in order to work them up to perfection; and how many horses' shoulders and fetlocks have been ruined by them, either by being too suddenly halted or by a blow; while all this is done in order to provide for a case "which might occur in war," but which never has occurred, and in order that no horse might be then lamed! How much more time and trouble would be available for the more important and more practical instruction, if less value was attributed to these so-called squadron drills, and if we could be contented with seeing that each man knew where he ought to ride in file, in sections or in half-sections, and no longer considered the change from one formation to another as a necessary part of an inspection. These drills are such a wearisome torment to the men, that they have become proverbial in the cavalry, and a trooper says: "I made him march in file," when he means that he has paid somebody out. It would be much better to practice extended trots in the various long columns on a narrow front, rather than to teach the men to change frequently from one formation to the other; for it is more important that the columns should keep exactly to their pace and order and should be well closed up, than that they should be able to rapidly change their formation.

Is not all this rather an old-fashioned whim, something like a pigtail, which hangs behind us, and which we should do well to cut off? My comrades of the cavalry will, I hope, pardon me this expression, since my attitude towards them is certainly not that of an enemy. Many officers commanding squadrons will be most thankful to me for what I have written, and will say: "Yes, certainly; if it were a matter of regulation that these squadron drills should no longer be gone through at inspections, as is now the case with the 'locking-up' of the infantry battalions, I should have my hands much more free for my real work."

15th Letter.

FIELD SERVICE.

THE exercises which take place during the month of July must be considered in connection with those which are held after the manœuvres and before the arrival of the recruits, since they consist, in addition to target practice and the repetition of the squadron exercises, principally in the instruction of the officers and in the practice of minor field service. This last has, since the latest greatest war, very much changed its former character. Who does not remember the time when every little detail of field service under a N.C. officer started from some grand general idea, which had only an indistinct meaning for the officer who gave it, and none at all for the man who carried it out. Even though all these general ideas did not begin in quite such a high-faluting style as the following (which are historical and almost classic) :

"Anhalt-Dessau, jealous of the increasing power of Prussia, &c., &c.," or "the nations of the West have revolted, and the nations of the East are advancing to attack them. You, Corporal Adams, are to lead a patrol towards Brauhausberg, &c., &c.," or "Berlin no longer exists, &c., &c.," yet they often so puzzled the imagination of the N.C. officer who was to carry them out, that he had no very clear notion of what he was to do, and this is worse than having none at all.

Yet even now the practice in field service has to overcome the fact that some general idea, some situation, must be laid down, and that this has as a rule no meaning. Some young lieutenant or a N.C. officer starts in the morning at the beginning of the practice of field service, and has first to take in every detail of some complicated plan of campaign, in accordance with which he has to imagine not only an enemy before him, but also his own troops which are supposed to be posted around and in rear of him; he has then perhaps to make believe that some cornfield is a marsh, or that a potato-field is a lake; and thus efforts are demanded from his intelligence and his imagination which they are not in a position to give, and which are moreover entirely useless. For nothing of this sort happens in war. The plan of campaign is then always the same, or at least its changes are so gradual from day to day, that they are scarcely noticed, since they form part of the soldier's life; again he has not got to imagine anything, for he sees the reality before him and has only to consider what is actually there.

One of the officers commanding a cavalry regiment under my command, being convinced that this was a defect in our minor practices in field service, discovered a manner of conducting them which did away with the greater part of these disadvantages, and which I thought so good that I directed the whole division to conform to it, and moreover mentioned it in more extended circles.

It was as follows: he in the spring decided upon a theatre of operations, which, working with the same system as is used for the reconnaissance

rides of the cavalry and the General Staff, might employ all the garrisons of his regiment (four in number) for three or four days in combined action. Immediately after the inspection of the squadrons he made, with his officers, a reconnaissance ride of three or four days through this theatre. Wherever the position of the garrison allowed it, he took the N.C. officers also with him. This he did either during the last days of June or at the beginning of July. The governing principle of the whole of the exercises in field service for the entire year was based on this theatre of operations, and he ordered that all practice in field service was to be carried out within the bounds of this theatre, which he had selected as the scene of his general idea. The consequence of this was, that it was no longer necessary for the officer conducting the practice in field service to think out a new general idea on each occasion, while the heads of those who had to carry it out were no longer troubled by having to work under fanciful conditions, which were often quite improbable and were sometimes even impossible. But the principal advantage consisted in the fact that the officers and N.C. officers carried out their minor practices in field service, just as they would in war, during the whole year under the same tactical conditions, and thus their proposals were far more reasonable. Moreover little time was lost in explaining or illustrating the tactical conditions and the practice could pass at once to the essential point, the actual measures to be taken by those who had to carry it out. This arrangement produced excellent results in training the men in field service. I have never seen a cavalry regiment so well trained as was that which adopted this system.

The plan had an additional advantage, inasmuch as each squadron as it marched (not only to and from the drill-ground, but also when it moved to concentrate on the head-quarters of the regiment, or to its exercises, or to the grand manoeuvres), had to advance with the precautions laid down by the regulations, such as sending out scouts and reconnoitring patrols, and was not allowed to take up any new cantonment, until it had received reports regarding it from the patrols. As these reports could not be made with respect to an enemy, they were made concerning the ground.

On one point only had I occasion to offer some criticism. I am however glad, and yet sorry, to say that I had to make the same observations to all the other cavalry detachments. In no case, in my opinion, was there a sufficient distance between the reconnoitring and* protecting parties. I must acknowledge that the two duties are closely connected. For if the reconnoitring patrols report decidedly that the enemy's troops have taken up their bivouac at such or such a point, we may consider that during that night we shall be safe, if we are at a certain distance from them; while, on the other hand, the report of a vedette or of an outpost patrol may be considered as a sort of reconnaissance report of the enemy's movements. But it is nevertheless necessary that the duties of reconnaissance and of security shall be carried out by entirely distinct bodies of troops. This is most obvious when on the march. A squadron or a troop which, when riding as the advanced guard of troops on the march, carries out the ordinary regulations for cavalry on the march, is practically useless as regards the reconnaissance of the enemy, since the leading file and flankers can, and may, only be at such a distance as will

* NOTE.—“Aufklärungsdienst” and “Sicherheitsdienst”; the latter includes outposts when halted, and advanced guards on the march. N.L.W.

allow their warning shots to be heard, and thus give time for the main body to prepare for action. All reports from this regulation formation will as a rule arrive too late, for by the time that they have been carefully made and fully understood a determined enemy may be already upon you. In no case are these files sufficiently far advanced to allow the receipt of their reports, concerning an enemy who has been found in position, to be ready in time to allow of the adoption of the regulation formations before the troops come under his fire. It is therefore necessary, in addition to the proper care for the security of troops, to send out officers' patrols some miles ahead. For the advanced guards have to keep the prescribed distance from the troops to which they belong while the reconnoitring patrols should ride on well in front until they come in contact with the enemy. The conduct of the former is governed by the position of their own troops, that of the latter by that of the enemy.

In most cases, when a squadron at the manœuvres was ordered to push forward from the rendezvous, with a view of gaining information about the enemy, the advanced guard trotted forward, and made its patrols and leading files gain their distance from the main body at a gallop, in the elegant manner which is laid down at page 206 of the regulations. But as a rule no one ever thought of at first remaining halted, of sending out fully instructed reconnoitring patrols along the various roads, and of allowing them a start of a quarter-of-an-hour.

On the other hand I certainly read lately in the *Militär-Wochenblatt* a complaint that too great a use of officers' patrols was made during the manœuvres. If I had noticed this I should have been delighted : for the object of the manœuvres is to afford proper practice to all the troops, and I can only think it exceedingly fortunate for cavalry officers, if during the manœuvres they have really good opportunities of working officers' patrols under service conditions, and of forwarding the necessary reports. It is very certain that in war we shall not have a sufficient number of officers to furnish a third of the officers' patrols which we are able to use at the manœuvres. But it is impossible to carry on everything at manœuvres as it would be in war. The necessity of making as much use as possible for purposes of instruction of the very costly days of the manœuvres, leads to many absurdities ; but these cannot be avoided. For instance, I remember that we have on many days fought three battles in succession, and this for three days together. If we tried to manœuvre properly, that is to say as in war, we might perhaps have one battle, or even not one, during the whole time of the manœuvres, and thus the small modicum of instruction and of practice in fighting which we should gain from them would bear no comparison with their enormous expense.

Owing to the great importance in war of the reports sent in by officers' patrols, it is necessary to take every opportunity of practising officers in them, in order that they may learn to rightly appreciate various military situations, and to report clearly and correctly what they have observed. When we read of the influence exercised by the well-known reconnaissance of major (now general) von Unger, on the 2nd of July, 1866, on the decision of the leaders of our army ; how during the advance to the Moselle, on the 12th and 13th of August, 1870, staff officers and even chiefs of the staffs of army-corps rode with the foremost patrols, with the object of correctly learning the situation of the enemy ; how important were the reports of those dashing cavalry officers, who rode between the

enemy's army-corps, and on the 24th, 25th and 26th of August, 1870, found out for certain the direction of MacMahon's march ; and how Goeben decided to carry out the concentration which led to the battle of St. Quentin, solely on the report of a single cavalry patrol which had pushed on boldly to the front ; we feel inclined to wish that every young cavalry officer, who might be employed with such a patrol, could receive the education of an officer on the general staff, and might thus be in a position to correctly comprehend and report on all tactical and strategical situations.

I know well that I am proposing nothing new, when I say that the service of security should be entirely separated from the service of reconnaissance. We might recently have read the same remarks in the criticism of a general in high position in a neighbouring army on some manœuvres by his troops at which he had been present. Verdy also calls for this separation in practice (in his book "The Cavalry Division in conjunction with an Army"), though he does not lay down the reason ; he recommends it even for the advanced cavalry divisions, which are themselves altogether intended for reconnaissance duty, since he advises that they should send out whole squadrons in front of their outpost line, and that these should move independently, with very large intervals between them, in the direction of the enemy. It will not be always possible to carry out this principle, especially when the space between the lines of vedettes of the two opposing forces has become very small. But no infallible scheme or universal plan can be laid down for the conduct of the service of reconnaissance by cavalry. The principles which govern the manner of the discharge of this duty depend so very much upon the character of the ground, upon the tactical situation, upon the efficiency or inefficiency of the enemy, upon his distance and upon many other circumstances, that they will vary in each particular case, and must be carried out with sound common sense in conjunction with a full acquaintance with the functions of cavalry and with the strategical situation. Moreover, reconnaissance is not guided by distinct forms and axioms as the service of security is. For this reason it must be entrusted to quite another class of officer.

If, for example, a vedette be ordered to patrol, it must abandon its duty as a vedette or it cannot ride very far to the front ; and if the head of an advanced guard on the march is to be used for reconnoitring duty, the advanced guard will, during the greater part of the march, have no head. This sort of thing is by no means rare, and I have therefore not considered it superfluous to lay special stress upon the necessity of separating the service of security from the service of reconnaissance.

I cannot refrain from here making a statement, which sounds like a paradox, but of which I have experienced the truth on many occasions, both in war and in peace ; namely, that in many, even in most, cases a simple officer's patrol reconnoitres better and sees more than an entire squadron or an even stronger detachment of cavalry. In the first place a whole squadron is more easily seen from a distance, and it is much more difficult for it to conceal itself, while a small clump of bushes is sufficient to hide a patrol, which can besides far more easily escape observation as it comes or goes. Again, an entire squadron, even though it be sent out for the purpose of reconnoitring only, is easily tempted to engage in a fight, and thus to betray its presence, and to allow itself to be involved in a line of action which in no way assists in the discharge of its duty. It is of no use to say that this ought not to be. It will

always be done all the same, and cannot sometimes be avoided without compromising its honour. But an officer who is sent out with only four troopers, for the purpose of bringing in news about the enemy, would never think of making a charge with that force. I remember distinctly how once at the manœuvres, with the object of reconnoitring on the flanks, a squadron was sent out by one force and an officer's patrol by the other. The squadron drew upon itself the artillery fire from the enemy's position, and had to fall back without being able to obtain any information with regard to the position of the enemy's infantry; but the officer's patrol crept through hollows and bushes close up to this same squadron, which did not notice it, and sent in the fullest information, not only concerning the squadron, but also with respect to the whole of the hostile position. It might of course be said that the squadron could have sent out an officer's patrol. But when a squadron has been given the whole duty to do, it is not inclined to play a minor part, while if the squadron is compelled to fight, the officer with his few troopers would be sorely tempted to hasten up and assist his comrades.

I can certainly very well remember one case, where a squadron made a false attack on one wing of the enemy's outpost line and broke through it, and thus attracted their attention and their troops towards itself, while on the other flank, under cover of the excitement caused to the enemy by this false attack, an officer's patrol from the squadron was able to see and to report upon all that it wished. I do not therefore desire to state categorically that a mere officer's patrol will always see more than an entire squadron, but only that this will usually be the case. And it is important in war to economise your strength, and not to use or tell off more troops to any duty than are absolutely necessary for its discharge. We ought thus to consider carefully, before we send an entire squadron on reconnaissance duty, whether in the given case a simple officer's patrol may not do as well, or even better.

16th Letter.

THE MANŒUVRES OF LARGE UNITS.

FOLLOWING the course of instruction, I come to day to the exercises of the regiment and of the larger units.

Thanks to the new drill regulations (of the 5th of July, 1876) and to the action of general von Schmidt, who died, alas, too soon, considerable progress has been made since the last war in the art of leading a cavalry regiment. The regiment has become more mobile and handy since the direction of movements is given by the centre, while since the squadrons need no longer stand in numerical order, but may be designated by the names of the squadron leaders, we have got rid of a certain clumsiness which was formerly inseparable from cavalry (especially if they were worked by a pedant), owing to the fact that inversion was forbidden. Skilful and practised commanders of regiments have learnt by these regulations to manœuvre so well that any improvement seems hardly possible, especially when the squadrons take care not to allow their horses, which have been brought into condition during the month of July, to fall off in any way, and with this object have exercised them once or twice a week, in addition to their other drills, in moving over long distances. Since the regulations are thus right in principle, I have no further critical remarks to make concerning them; for if some individual officers have perhaps not quite worked up to these principles, yet this is not the place in which to enter upon that question. I will here mention only two points which have generally attracted my attention; these are, the flanking squadrons, and the second line.

A regiment can, as we know, either make a frontal charge in line, or it can send a (wing) squadron against the enemy's flank; I am speaking of the case when a charge is made in one line against cavalry. I have almost always seen very intricate manœuvres carried out by these wing squadrons, and I doubt very much whether such movements could have much effect against a determined enemy, or could do him much harm. For great importance is always attributed to the simultaneous action of the wing squadron which is sent against the enemy's flank; that is to say, this squadron must receive the commands "Charge!" and "Halt!" at the same moment as the rest of the regiment, and must after the halt find itself on the flank of the regiment with its own outer flank thrown forward.* In order to carry out this task some intricate manœuvre must be performed, such as would be impossible before the enemy, for the squadron which attacks his flank has a greater distance to travel than the others, and must thus begin to gallop earlier, or, what would be better,

* NOTE.—"Im offensiven Haken stehen." The "offensive hook" is formed by the wheel of a flank squadron or company to the front, the "defensive hook" is the opposite, where the regiment throws back its outward flank. These are tactical expressions common to all arms. N.L.W.

the rest of the regiment must check its pace (that is to say must not begin to gallop so soon), even though the proximity of the enemy may call for an immediate increase of pace.* But if the detached squadron moves to the flank while the regiment is still at the trot, then the interval between them will be so large, that the former, let it gallop as hard as it may, cannot come up at exactly the nick of time, so as to make the action simultaneous. Moreover all this, when it is carried out on the drill-ground, requires such an amount of make-believe and such conventional arrangements as can by no means be necessary when there is a visible enemy to be attacked; for unless the officer commanding the detached squadron knows at what distance the officer commanding the regiment proposes to give the word "charge!" he will either keep too far away from the regiment and finish his charge at a distance from it, or he will not allow sufficient interval, in which case he will either charge his own regiment from the rear or he will gallop across their front. All this sort of thing looks so terribly bad, that one begins to doubt whether such and such a regiment would be of any use in front of the enemy. But as a matter of fact such a thing cannot take place on service, for then the enemy's flank is a real object which you mean to charge, and which you can charge; all this is therefore a useless complication, which worries and tires the troops without any object.

We may add that it will be exceedingly difficult to strike the flank of an enemy, if he is in any way trained to war, by such a manœuvre as this. For if a squadron detaches itself from the mass and moves round the enemy, he will send out some force against it, and it will thus have to carry through a fight of its own on a small scale, and will be quite unable to attack the flank of the main combat.

Again a charge on the enemy's flank is much more effective when it takes place immediately *after* the clash of the two charging lines, than if it be simultaneous with it. For the two lines rebound from each other and then interlock, after which for some minutes there is a terrific whirl of struggles, blows, shouts, yells, and curses. Old soldiers have told me, when I was still a young officer, that eleven times out of twelve cavalry charges led to no hand-to-hand fighting. One of the two lines, they said, always went about before they came in contact, while the other rode after it for a certain distance, but never caught it up. I have never seen this in war. I must say, for the honour of our enemies, that I never saw a charge which was not met by the hostile cavalry. The crash always took place, and then the interlocking and the *mêlée*. The scale of victory inclined in favour of that force which had still some closed troops in hand, or whose closed troops pressed in to aid, especially on the flanks, and when this moreover took place from one to two minutes after the shock. Then the *mêlée* lasted for at least one or two minutes, as far as I have seen, and sometimes from five to ten. Some of the troopers had by that time ridden through the press, while others were still interlocked and were fighting at the halt. After a time single troopers of both sides broke out in rear of the *mêlée*, drawing off, while the depth of the line constantly increased. Some of the enemy pursued these individual fugitives. That side towards which, at the last, most troopers fled, was beaten. At this crisis closed troops produced a great moral and physical effect; especially when they rode up hard from a flank and thus rather

* NOTE.—The best movement for the detached squadron is; half-right! (or half-left!) by half troops, forward! right! (or left!)

rode down than cut down such of the enemy as stood in their way. Anyone who has seen such a combat can have no doubt, but that the flank attack will have more effect one or two minutes after the shock, when the mêlée is in full swing, than if it were simultaneous with the crash. One to two minutes! What an enormous time that is for galloping cavalry. I mean by this, that the success of the flanking squadrons will be much more certain if they advance as flank squadrons of the attacking line up to the moment when the word is given to charge, and then leave the latter by a slight change of direction at a moderate gallop; they will then wheel up and charge in close order into the stationary mêlée on the flank of the enemy; he will not have observed them up to the moment when he also gives the word to charge to his troops, and will thus have no time to make dispositions to meet them. It is possible, and even probable, that the enemy may thus be surprised, since as a rule the dust plays a great part in such actions, as it would envelope the flanking squadrons moving in column of half-troops, and would hide them from the enemy's view.

In the majority of cases of charges against the flank of an enemy, the squadron-leader rushes on as he shouts "charge!" and does not wait for his flank to complete the wheel; the result is that the charge is made in loose order. Moreover, the object of the charge is in motion, and thus the squadron, if it hopes to be able to keep its close order, must be well trained in moving on its point. I have already, in my 14th letter, mentioned this matter.

What I have said with regard to the complication of these flanking movements, has still greater force when the regiment is formed in two lines, and yet more when the whole regiment (and most, when the whole brigade) forms the second line of a large cavalry mass. The distance to be traversed is then so great, that it is exceedingly difficult to surprise the enemy, if the great mass of cavalry divides itself for the purpose of gaining his flank. In this case, the ordinary complaint is, that the second line comes up too late, because it has not ridden hard enough. It would be easier to arrange for a simultaneous attack of the two lines, if the first were sent against the enemy's flank, and the second against his front, a manœuvre which is laid down in para. 200 of the regulations. General von Schmidt preferred this manœuvre to any other, when his object was to gain the enemy's flank with one of the lines. You may think that this system would by no means facilitate a surprise of the enemy, since a flanking movement of the first line would be earlier and more easily seen than one of the second. Yet, when I have seen this evolution carried out at the manœuvres, the enemy has invariably been surprised, and always owing to the cover given by the dust. For if the first line (which the second follows) wheels away (either by a half-wheel and a return to the original direction, or by wheeling by half-troops, followed by a change of direction), and the second line remains invisible owing to the dust of the first, the enemy imagines that the whole mass of cavalry is taking ground to a flank; he hopes to ride them down while they are carrying out this movement, and thus changes his front and charges. The first line then wheels to its proper front and charges, while the second goes straight on into the mêlée, and strikes the enemy, as he changes his direction, directly on the flank or even in rear. There can be no doubt as to the success of such a charge if it be carried out with precision.

But it must not be forgotten that such a charge should not be risked, except with cavalry, which is exceedingly well disciplined and trained, unless you are prepared to lose more with respect to the closeness of the order, and the weight of the shock than you will gain by the evolution and the flanking movement. Just think of the feelings of the troopers of the first line, who have to move quietly to a flank, and to wait for the signal to charge, while they see the enemy's mass of cavalry galloping headlong down upon their own flank. Moreover, a regiment must be well accustomed to manœuvre at a gallop, if at the trumpet-call "front!" it can immediately change from column of half-troops into a well closed-up charging line; when we consider all this, we are inclined to say that the whole thing is so complicated that it cannot succeed. But similar stratagems have succeeded before the enemy. Old Blücher, when he was a colonel of Hussars, drew on the clumsy French cuirassiers by wheeling about by half-troops and trotting away as if in flight; as soon the pursuit had somewhat disordered the enemy, he sounded the "front!" and the "charge!" General von Hymmen, as a captain, did a similar thing with a squadron at Blumenau. He wheeled-about and made the two troops diverge as they retired, until the enemy had followed him so far, that on the calls "front!" and "charge!" they received a charge on both flanks. In cavalry slang, this is called "letting down the flap." If, in former days, it was possible to carry out such a movement as this (which will be generally acknowledged to be more difficult than the other, as it is certainly harder to direct cavalry who are trotting away before the enemy, than it is to lead a flanking attack), the easier of the two manœuvres must decidedly be possible in these days. But we must not forget that the troops must be exceedingly well trained if this coup is to succeed. No one must venture to attempt it with newly raised troops (such as Landwehr cavalry), nor with a force of cavalry which, owing to the length of the campaign, and the losses which it has suffered, has been filled up with half-trained and inferior men and horses.

This must not, of course, be taken as an universal receipt for use in every possible case; indeed, the regulations do not lay down any decided directions for the conduct of the second line, but merely (para. 217) point out its duty, and mention (paras. 184 & 196) some movements as examples.

At the time when these regulations were only provisionally issued, and were sent out for trial by the troops, I heard many complaints from the cavalry that the distance between the first and the second line, as therein laid down (300 paces), was too great; at a later date, when the regulations had been definitely issued, all complaints, of course, ceased against what then became a sanctioned and prescribed form. It was thought that the second line could not be engaged in time if it followed the first at so great a distance. I cannot at all agree with these complaints, for I think that the distance of 300 paces is rather too short than too long. There is certainly some difficulty, in peace exercises, in so directing the second line at a distance of 300 paces, that it engages at the right time, that is to say, so that the flank attack coincides exactly with that of the first line. In peace, much more time is lost than in war in making dispositions for attack, especially when working against an imaginary enemy, since the officer commanding the division has first to inform the leaders of lines whether the charge is to succeed or no, and thus, whether they are to outflank the enemy, to cover their

own flank, or to support the first line. All this has to be laid down, to be understood, and then to be carried out. Since, after that, the distance of 300 paces has to be traversed, it naturally appears very long. In peace, the officer commanding the division, keeps with the first and second lines, but in war with the third, since that is the only body of troops over which he retains the command; he would lose his hold upon this also if he went forward into the *mêlée*. In war again, no further directions are given to the second line than that it is to overlap the right or the left of the first. The officer commanding the line must himself decide upon and order everything else, for in war, when the attack has once commenced, the commander of the division (who is either with the third line, or on high ground near his artillery), can no longer send any order in time, either to outflank the enemy, to cover the flank against him, to support the first line, to disengage it, or to prolong it. The officer commanding the line has to do all this, for he must observe all the dispositions made by the enemy, and act accordingly. Thus, as soon as the order is given to charge, the second line also passes altogether out of the hand of the officer commanding the division.

All this is quite different in peace, for then the ideas of the divisional commander with reference to the enemy have to be first explained and understood.

In war, as I have already said, it does no harm, and may perhaps be of great advantage, if the second line does not strike the enemy's flank at the exact moment when the first line reaches his front, but does so from one to two minutes later; therefore, even 200 paces more between the lines would be unobjectionable, since these could be traversed in half-a-minute; but in peace it is expected that the attacks shall be simultaneous to a second.

For this reason, great latitude is allowed by the regulations to the second line, even though it is expressly laid down (para. 217) that it is to follow the first line at a distance of 300 paces, and overlapping the named flank; for it is added that this relation is to be correctly kept up until the second line itself begins to attack. But the commander of the second line is himself allowed to be the judge-of when the moment for this attack has arrived.

When, therefore, certain cavalry leaders have considered that the second line is intended to conform to every movement and pace of the first, while still keeping its relative position and distance, up to the moment when the latter passes from the gallop to the charge, they entirely mistake the meaning of the regulations, and judge only by peace manœuvres; for this moment may under various circumstances appear much too soon or much too late for the independent movement of the second line. This depends upon what the enemy does, how strong he is, and what dispositions should be made against him. For it may be that the enemy is so weak, that any action of the second line is unnecessary, and that it will thus preserve its distance; or it may be that, some time before the order is given to charge, the enemy's front is found to be wider than was imagined, and thus it becomes necessary to prolong the front of the first line, &c., &c.

It has been reckoned from the above that, if the second line follows the first, while overlapping it, at a gallop at a distance of 300 paces, that it will lose 400 paces per minute when the latter passes to the charge, and will thus almost immediately be 700 paces from it; but this computation is founded on the faulty supposition that the second line

will not venture to change its distance from the first until the moment when the latter passes to the charge. This supposition is correct only when, owing to some mistake, the first line charges without the second line knowing what it is to do. In war, this would be the fault of the second line; but in peace, on the drill-ground, the divisional commander would be blamed for not having told the second line, before the charge took place, what sort of an attack he wished to carry out. For in war, the commander of the second line has himself to decide as to which of the duties of the second line (as laid down in para. 217 of the regulations) he has to discharge, namely: (a) To outflank the enemy; (b) To cover the flank of the first line; (c) To support it; (d) To disengage it without an engagement; or (e) To prolong it. In this case the divisional commander merely informs the first line as to the object which it is to attack, and gives an order to the second line as to which flank of the first it is to overlap; he then goes back to the third line or his artillery.

But, in peace, especially when acting against an imaginary enemy, the fancy of the divisional commander has to supply many details with regard to all these matters, since there is no enemy to furnish them. Even when acting against an enemy whose position is marked either by flags or by weak detachments, he has to direct their movements, and this materially increases his difficulty in leading the whole. He must moreover go himself to the front, that is to say into the first or second line, in order to correct mistakes in time, and in order to give the whole a certain resemblance to war, so that so much time and exertion as is expended in the movements may not be altogether wasted or even produce false impressions. Again he must be in front in order to observe and criticise such mistakes as may be made, and also to teach his subordinates. Owing to this forward position of the divisional commander in peace manoeuvres an unavoidable difference exists between them and actual war; the disadvantage of this is that, if peace continues for a long time, everyone comes to believe that a division ought to be led in this manner in war. For this reason it is necessary to call to mind at every opportunity that the situation is very different in war; otherwise what we have been accustomed to in peace will be carried out in the next war and we shall in consequence suffer serious loss.

It would almost appear from all this that it is easier to command a cavalry division in war than it is in peace. To a certain extent this is the case; at any rate it is simpler; in war everything is simple, but the simplest thing is difficult. The difficulty in war does not lie in the complexity of the evolutions and in the number of dispositions to be made simultaneously, but in the deep feeling of responsibility which weighs upon the divisional commander, as to the right choice of the moment for the general attack, for if it be too early or too late the losses will be enormously increased, and the proposed success may turn out a failure.

In a similar manner, as I have said above, the second line will in war have less difficulty in coming up at the right moment, for during the *mêlée* of the first line it will have a margin of some minutes, during which it can pass over 1000 paces at a gallop. The difficulty for the leader of the second line consists in a right appreciation of the situation, and in the necessity of deciding which of the five duties of the second line is the most important at the moment. For if he makes any mistake he will be beaten back. If, for example, he moves his line so as to cover the flank of the first line and at the same time charge the enemy's flank (para. 197),

at a time when it would have been better only to prolong the first line, his inner regiment will be rolled up from the outer flank, and his outer regiment from the inner.* Moreover the commander of the line has to make his decision and to issue the necessary orders for carrying it while moving at a sharp drill-gallop, for he must himself move with the first line, on that flank which is overlapped by his second line.

Picture to yourself the leader of the line as he gallops along; dust, and perhaps rain also, blinds his eyes, a long gallop has made him lose his breath, his horse has pecked as he jumped some ditch or hedge, and he has only just saved him from a fall; he arrives at the top of an undulation of the ground and sees the enemy galloping towards him; he has now at once to make up his mind what he will do, and to give immediate orders. He has no time to think; even if he pulls up and gives his orders at the halt, his line is only 300 paces behind him, in half-a-minute it will be upon him, and even then his orders may be too late. Would he not then be inclined to think that the distance of 300 paces was rather too short than too long?

If you clearly put before yourself the position which I have described above, it will be evident to you how much harder it is to lead a cavalry division or a cavalry brigade of a division, than it is to command an infantry division or an infantry brigade of a division; since with the latter there is plenty of time for everything, and you can, with your field-glass and your map in your hand, quietly weigh the pros and cons, and then give the needful orders.

What a number of qualities must a leader of cavalry (whether of a regiment, a brigade, or a division), possess, if he is to be really efficient at his work! He must first be a good rider across country, better indeed than any of those under him. He must moreover be hard, so that neither exertions by day and night nor the longest gallop may affect him in the least. He must have the eye of an eagle, for he has no time to use his field-glass, which will probably be useless owing to the dust and rain. He must be a man of quick decision and of strong will, for he has no time for consideration or for counter-orders. His position demands all these qualities, in addition to those which are expected from every officer of any arm.

These difficulties are even greater, when the cavalry mass comes across the enemy while it is on the march, and has to change its order of march for the order of battle in three lines. I have already spoken of this in a former letter (the 12th). If the cavalry mass is marching on several parallel roads, it may be necessary that the brigade commander, and even the regimental commanders should possess the very highest strategical talent, if he is to reconcile the orders which he has received with the perhaps entirely changed conditions which obtain with regard both to himself and the enemy. It is not sufficient that he is a skilled and practised leader of his own arm; he must have mastered strategy and both the elementary and applied tactics of all arms.

When one realises that all these requirements are demanded from a leader of cavalry, one is inclined to hesitate before uttering a severe reproof, if by chance a mistake is sometimes made.

* NOTE.—As this appears obscure to me, I attach the original German, in the hope that someone may be able to make it clearer. It runs; "dann wird sein inneres regiment vom äusseren, sein äusseres regiment vom inneren Flügel her aufgerollt." Working it out on paper, it would seem that the inner regiment would be rolled up from its inner flank, and the outer from its outer. N.L.W.

NOTES:

BY VARIOUS HANDS.

ARMY RIFLE MEETING, 1888.

RANGE-FINDING COMPETITIONS.

THE following is an abstract of the results of the Range-finding Competitions at Aldershot this year.¹

There were three matches open to all Non-Com. officers and men of the Army, except Instructors, School of Range-finding.

1st Match.—For Infantry range-finders (Weldon or Watkin).

Conditions.—Two ranges under $\frac{3}{4}$ mile. No score if error over 50 yards, or time over $2\frac{1}{2}$ minutes, in either range.

11 entries.—Nine elected to use the Watkin range-finder; two the Weldon.

Objects.—1st range—Engineer cart—chained distance 956 yards.

2nd range—Bush „ 1265 „

Prize.	Instrument used.	Winners.	1st range.		2nd range.	
			Reading.	Time.	Reading.	Time.
1	Watkin.	S.-Sergt. Lloyd, School of Musketry, Hythe	yards. 965	min.secs. 1 48	yards. 1275	min.secs. 1 40
2	„	Q.-M.-Sergt. Edwards, „ „	950	1 55	1245	1 52
3	„	Sergt. Harrison, A/A, R.H.A.	975	1 42	1252	1 37

2nd Match.—For Artillery range-finders (Watkin).

Conditions.—Two ranges, one under, one over 2 miles. No score if error over 70 yards in short range, or 120² yards in long range, or if time over 5 minutes in either range.

18 entries.—14 Artillery, 1 Marine Artillery, 3 Infantry.

Objects.—1st range—Tree 2971 yards.

2nd range—House 5540 „

¹ For results in 1887, see Notes, No. 13, Vol. XV., R.A.I. "Proceedings."

² Extended to 160 yards on account of the exceptional length of the 2nd range, and the bad light at the time of the match.

Prizes.	Winners.	1st range.		2nd range.	
		Reading.	Time.	Reading.	Time.
1	Corporal J. Hillier, D/3, R.A.	yards. 2975	min. secs. 1 52	yards. 5550	min. secs. 2 50
2	Corporal C. Jacquest, A/2, R.A.	2950	2 5	5700	5 0

3rd Match.—Cavalry and Artillery mounted competition.

Conditions.—Teams to bring their own instruments and equipment—Weldon or Watkin—one quarter mile over two fences, take range, and mount again. Two¹ ranges under one mile. No score if error over 100 yards, or time start to finish over 7 minutes in either range.

8 entries.—All Artillery teams with Watkin range-finder.

Object.—Engineer cart.—Chained distance, 1618 yards.

Prize.	Winning Teams.	Range.	
		Reading.	Time.
1	A/A, R.H.A. (Sergt. Harrison)	yards. 1615	min. secs. 6 51
2	V/1, R.A. (Bombr. Parker)	1630	3 54

Of the remaining six teams, two disqualified for time. The following qualified :—

	Reading. yards.	Time. mins. secs.
C/A, R.H.A. (Sergt. Graham)	1834	5 0
C/3, R.A. (Corpl. Thomas)	1842	4 25
D/3, R.A. (Sergt. Atkins)	1843	5 0
C/A, R.H.A. (Corporal Williams)	1855	4 30

¹ Owing to the very wet weather at the Meeting, the matches were much delayed, and it was found necessary to decide the mounted match on the result of one range only.

POLO.

ROYAL ARTILLERY (WOOLWICH) v. 19TH (PRINCESS OF WALES'S OWN) HUSSARS.

(From the "Field.")

THIS match was played at Woolwich on Saturday, June 16, and resulted in an easy victory for the Artillery by eleven goals to two. The home team had the game in hand from the commencement, and played well together. Goals were obtained by Mr. Ferrar, who secured five, Mr. Askwith three, Mr. Lamport two, and Capt. de Robeck one; whilst for the visitors Mr. Walker and Mr. Swan obtained a goal each.

SIDES: *Royal Artillery*—Mr. Askwith, Mr. Ferrar, Mr. Lamport, and Capt. de Robeck. *19th Hussars*—Capt. Walker, Mr. Craven, Mr. Clementson, and Mr. Swan. Umpire, Mr. Yunge-Bateman, R.A.

KENT COUNTY v. ROYAL ARTILLERY.

(From the "Field.")

ON June 25 the above teams played their return match at Charlton Park. For some time the game was entirely in favour of the Artillery, who scored rapidly, and at the end of the first quarter the score stood four goals to love. In the second quarter this was increased to five, contributed by Mr. Ferrar. In the third quarter, Kent playing up, a goal was secured by Capt. Tufton, which was, however, soon followed by two more for the Artillery. Towards the end the game became more even, and Kent, playing better together, looked several times very dangerous, but failed to score, and the match ended in favour of the R.A. by seven goals to one. For the Artillery, Capt. de Robeck and Mr. Ferrar both played in excellent form. For Kent, Major Peters, well supported by Mr. Stewart Saville, played a very good uphill game.

SIDES: *Kent*—Major Peters, Capt. Tufton, Mr. Stewart Saville, and Mr. Glover. *Royal Artillery*—Mr. Lamport, Mr. Ferrar, Mr. Schofield, and Capt. de Robeck. Umpires, Mr. Powell and Capt. McLaughlin.

INTER-REGIMENTAL POLO TOURNAMENT AT HURLINGHAM.

(From the "Field.")

THE Military Tournament commenced on Tuesday, the 3rd July, the following Regiments having entered teams: 2nd Life Guards, Royal Horse Guards, 9th Lancers, 10th Hussars, 18th Hussars, who, however, scratched the 15th Hussars, 18th Hussars, and Royal Artillery.

The steady downpour of rain experienced in London on Monday quite precluded the possibility of carrying out the programme arranged for that day. This

consisted of the opening of the competition for the Inter-Regimental Cup, which, consequent upon the state of the weather, had to be postponed until the following day. A strong breeze and a little sunshine had done something to dry up the ground, which, however, played very dead. Unfortunately just after the first match was over, a heavy shower fell, and this was followed a little later by another of equal severity during the progress of the second match. The ground consequently became very much cut up and this interfered a good deal with play. The first match was between the Royal Artillery and the 2nd Life Guards, the former team—who last year opened the competition, playing the 13th Hussars, by whom they were defeated—this year played Mr. Askwith instead of Mr. Belfield, and showing a rather stronger combination than the 2nd Life Guards, they won a well-contested game by eight goals to two, though one of their goals was hit by a player when off-side, and should have been disallowed. For the second match, the 9th Lancers were pitted against the 15th Hussars. For the first match the following were the sides: *Royal Artillery*—Capt. Jeffreys (back), Capt. H. E. W. de Robeck, Mr. J. B. H. Askwith, and Mr. H. M. Ferrar. *2nd Life Guards*—Capt. M. J. C. Longfield, Capt. W. A. E. Boyd (back), Mr. R. Cunliffe-Smith and Mr. E. T. Lumb. Umpire, Mr. John Watson. Taking the initiative, the Royal Artillery hit away to the stables, and, keeping the ball in the vicinity of the goal, made repeated attacks, but each one resulted in a wide ball, or was turned by the defence. After some five minutes had been thus occupied, the 2nd Life Guards took the ball up to the shooting enclosure, when it was turned back, but with a good rally they finally drove it to the chestnuts goal and hit wide. Again the Royal Artillery bore down upon their opponents, and, after several attempts Captain de Robeck secured the first goal with a back-handed hit during a scrimmage. The other side soon equalised the score, however, for directly the ball was re-started, they worked it up to the goal, and Capt. Boyd taking up a ball left by Capt. Longfield, put it through the posts. The Royal Artillery now had the best of it till the first interval arrived, and Mr. Askwith succeeded in making the third goal. On a resumption of hostilities the Royal Artillery led out, and Capt. de Robeck and Mr. Ferrar were very active, the fourth goal was quickly secured, and this was followed by the fifth hit by Mr. Ferrar. It was some time before the 2nd Life Guards could make any headway; but once getting a start, they made a quick run, and though they met with one or two checks the ball was eventually driven through the posts by Capt. Longfield. This success was very soon counterbalanced by the seventh goal hit by Mr. Ferrar. In the third twenty minutes play the 2nd Life Guards gave promise of better success, but though they worked with great persistency, each ball they sent up either went wide or was stopped by Capt. Jeffreys. Then the other side attacked, and Mr. Ferrar made the eighth goal and again placed a ball, with which Capt. de Robeck scored the tenth goal. It was a good game all through, and would have been much faster had the ground been less soft. The losers hit widely at times, apparently from over-excitement. The match ended by a fast run of the 2nd Life Guards, the ball missing the goal by a few inches only. This left the score eight to two in favour of the Artillery. In the second match the 9th Lancers defeated the 15th Hussars four goals to nothing.

Wednesday, July 4th.—This was the second day of the competition, and the Royal Horse Guards confronted the 18th Hussars whom they defeated eight goals to two, the 18th Hussars having scratched the 10th Hussars, drew a bye.

Thursday, July 5th.—The second ties for the Inter-Regimental cup were decided this afternoon. The weather was fine and bright, only one shower falling, but there had been some heavy rain in the morning, and this had left the ground very soft, so much so, that before the second match was over it was badly cut up. The first match was between the following sides:—*9th Lancers*—Capt.

J. H. Lamont (back), Capt. W. K. W. Jenner Jenner, Mr. F. F. Colvin and Mr. F. W. Duff. *Royal Artillery*—Capt. H. B. Jeffreys (back), Capt. H. E. W. de Robeck, Mr. J. B. H. Askwith and Mr. H. M. Ferrar. Umpire, Mr. Watson. Mr. Colvin hit off, and for the first five minutes the ball never left the Royal Artillery quarters. At the end of this time the first goal was hit by Mr. Duff, after Captain Jenner and Mr. Colvin had been ridden out. On re-starting, the 9th Lancers ran the ball out and scored straight away, Captain Jenner hitting the goal. The Royal Artillery were kept almost entirely on the defensive, and, although Captain Jeffreys saved his goal many times, it was soon down before a hit by Capt. Jenner. Capt. Jeffreys then made a good run to the stables, but was ridden out. Being well supported, however, by Capt. de Robeck, the ball was kept near the goal, Mr. Ferrar was soon able to put it through. Encouraged by this success the Royal Artillery again attacked but hit wide; their opponents ran it back, and Mr. Duff scored with a ball hit up by Capt. Lamont. The second twenty minutes play produced two goals, made respectively by Mr. Colvin and Mr. Duff. Capt. Jeffreys played capitally and made two or three good runs, and Mr. Askwith made some serviceable hits, but, except now and then, the 9th Lancers were the aggressors. After the second interval the Royal Artillery played decidedly better. Twice Capt. Jeffreys hit away vigorously, and more than once they really succeeded in scoring, then they only just saved their own goal, but in another attack Mr. Colvin secured the eighth goal. The 9th Lancers, after another hard fight, placed another goal to their credit, Mr. Duff making the hit, and the match ended. Of the nine goals scored, the 9th Lancers made eight and the Royal Artillery one. The next match was between the 10th Hussars and the Royal Horse Guards, the former winning by nine goals to nothing. Thus, the 9th Lancers and 10th Hussars were left for the final tie, which was played on Saturday, and resulted in a victory for the 10th Hussars, by five goals to love.

ROYAL ARTILLERY, WOOLWICH, v. ASHTEAD POLO CLUB.

THIS match was played on Wednesday, July 11th at Charlton Park, and resulted in a victory for the Artillery by four goals to three. At the end of the second quarter the Ashtead Club had scored two goals to nothing. However, the Artillery, playing better together, soon equalized matters, and at the end of the third quarter the game stood two goals all. In the last quarter some fast play was exhibited on both sides, Mr. Ferrar and Mr. Fraser-Tytler making two fine runs, but they hit wide and failed to score. Just as time was called the Artillery made their fourth goal out of a scrimmage. For the visitors, Mr. Fraser-Tytler and Mr. W. Peake played well; while for the Artillery, Mr. Ferrar and Mr. Schofield worked hard.

SIDES: *Ashtead Club*—Mr. Malcolm Peake (one goal), Mr. Fraser-Tytler (one), Mr. W. Peake (one), and Mr. Milne. *Royal Artillery*—Mr. Lamport, Mr. Schofield (two goals), Mr. Powell, and Mr. Ferrar (two).



CRICKET, 1888.

ROYAL ARTILLERY v. GREEN JACKETS.

18TH AND 19TH JUNE.

GREEN JACKETS.

<i>1st Innings.</i>		<i>2nd Innings.</i>	
Mr. W. E. Lascelles, c and b Adair	...	36 c King b Dorehill	...
Mr. W. H. Salmon c Key b King	...	5 c Dorehill, b King	...
Capt. Leonard Russell, b King	...	0 b Dorehill	...
Mr. W. V. Eccles, b Adair	...	0 b Adair	...
Capt. G. Cockburn, c King, b Adair	...	48 b Adair	...
Hon. J. Maxwell Scott, b Adair	...	9 b Curteis	...
Major L. Bathurst, c Abdy, b Anstruther	...	8 b Curteis	...
Major N. de B. Fenwick, b Anstruther	...	0 b Curteis	...
Capt. H. W. Stratford, not out	...	17 c Haggard, b Curteis	...
Private Murphy, b Adair	...	0 b Adair	...
" Sheppard, b Adair	...	8 not out	...
Byes, 4; leg byes, 3	...	7 Byes, 12; leg byes, 13; wide, 3; no ball, 3	...
Total	...	Total	...

ROYAL ARTILLERY.

<i>1st Innings.</i>		<i>2nd Innings.</i>	
Major Anstruther, b Murphy	...	44 c Maxwell Scott, b Stratford	...
Mr. J. Haggard, c Bathurst, b Stratford	...	8 b Stratford	...
Mr. Dorehill, c Maxwell Scott, b Stratford	...	0 c and b Stratford	...
Capt. Curteis, c Russell, b Stratford	...	16 c Bathurst, b Stratford	...
Mr. Adair, b Murphy	...	5 not out	...
Capt. Abdy, c Maxwell Scott, b Murphy	...	20 b Lascelles	...
Mr. C. D. King, not out	...	17 c Maxwell Scott, b Lascelles	...
Major Stephenson, b Murphy	...	4 b Murphy	...
Mr. J. MacMahon, c Cockburn, b Murphy	...	2 b Lascelles	...
Mr. C. Cooper-Key, c Lascelles, b Murphy	...	3 c Maxwell Scott, b Lascelles	...
Capt. de Robeck, b Stratford	...	0 c Salmon, b Stratford	...
Byes	...	7 Byes, 9; leg byes, 2; wide, 3	...
Total	...	Total	...

ROYAL ARTILLERY v. B. B.

22ND AND 23RD JUNE.

B. B.

<i>1st Innings.</i>		<i>2nd Innings.</i>	
Mr. L. Wilson, c Simpson, b Barton	...	97 b Dorehill	...
Mr. M. A. Streatfeild, c Stephenson, b Adair	...	7 b Barton	...
Mr. F. S. Ireland, b Dorehill	...	10 c King, b Barton	...
Mr. A. M. Streatfeild, b Dorehill	...	0 c King, b Dorehill	...
Mr. A. W. Fulcher, c King, b Pearson	...	1 c Adair, b Dorehill	...
Mr. B. H. Latter, b Dorehill	...	0 c Cooper, b Adair	...
Capt. C. W. Evans, b Pearson	...	0 not out	...
Mr. C. T. Boosey, b Barton	...	21 b Adair	...
Mr. W. Foord-Kelcey, c Cooper, b Curteis	...	21 c Simpson, b King	...
Mr. H. F. Kemp, b Barton	...	2 c King, b Adair	...
Mr. F. W. Cornwallis, not out	...	0 run out	...
Byes, 5; leg byes, 7	...	12 Byes, 7; leg byes, 8; no ball, 1	...
Total	...	Total	...

ROYAL ARTILLERY.

<i>1st Innings.</i>				<i>2nd Innings.</i>			
Mr. Adair, b Kemp	...	...	61	not out	...	...	4
Bombr. Barton b Ireland	...	...	0				
Mr. Dorehill, c Latter. b Wilson	...	...	24	not out	...	...	2
Mr. Haggard, b Kemp	...	...	38	b Boosey	...	...	1
Capt. Curteis, b Ireland	...	...	16	b Ireland	...	...	0
Mr. C. D. King, c Fulcher, b Kemp	...	...	4	b Ireland	...	...	0
Major Stephenson, b Boosey	...	...	18				
Corpl. Pearson, c Wilson, b Ireland	...	...	6	c Boosey, b Ireland	...	...	16
Mr. Cooper, not out	...	...	37	run out	...	...	19
Mr. MacMahon, c F. Kelcey, b Wilson	...	...	21	b Ireland	...	...	1
Capt. Simpson, b Ireland	...	...	11	c Kemp, b Boosey	...	...	1
Byes, 11; leg byes, 7; wide, 1	...	...	19	Leg byes	...	...	3
Total	...	...	255	Total	...	...	47

ROYAL ARTILLERY v. HOUSEHOLD BRIGADE.

CHELSEA, 25TH AND 26TH JUNE.

HOUSEHOLD BRIGADE.

Lt.-Col. Rowley, lbw., b Pearson	...	...	43
B. C. Wentworth, Esq., b Selater-Booth	...	...	26
Maj. St. John Mildmay, b Barton	...	...	7
H. Ruggles-Brise, Esq., c Haggard, b Dorehill	...	...	49
Corpl. Walker, lbw., b Dorehill	...	...	26
Lord Athlumney, c Cooper, b Anstruther	...	...	19
J. H. R. Bailey, Esq., b Dorehill	...	...	2
F. Heyworth, Esq., c Dorehill, b Adair	...	...	1
D. A. Kinloch, Esq., c Selater-Booth, b Pearson	...	...	7
W. G. Marshall, Esq., c Cooper, b Barton	...	...	6
Corpl. Anderson, not out	...	...	0
Byes, 14; leg byes, 4; wide, 2	...	...	20

Total ... 206

ROYAL ARTILLERY.

<i>1st Innings.</i>				<i>2nd Innings.</i>			
Major Anstruther, b Anderson	...	...	2	b Anderson	...	...	3
H. R. Adair, Esq., c Anderson, b Wentworth	...	...	13	lbw., b Wentworth	...	...	5
Bombr. Barton, st Rowley, b Wentworth	...	...	43	st Rowley, b Wentworth	...	...	5
P. H. Dorehill, Esq., b Walker	...	...	1	c Athlumney, b Anderson	...	...	4
J. Haggard, Esq., b Anderson	...	...	14	c Rowley, b Anderson	...	...	3
E. S. Cooper, Esq., c Rowley b Anderson	...	...	3	not out	...	...	17
Capt. Purvis, b Anderson	...	...	5	b Anderson	...	...	7
Corpl. Pearson, st Rowley, b Wentworth	...	...	15	b Anderson	...	...	6
Hon. R. S. Booth, st Rowley, b Wentworth	...	...	1	b Anderson	...	...	3
A. Cooper-Key, Esq., b Anderson	...	...	2	b Wentworth	...	...	3
Major Stephenson, not out	...	...	0	absent	...	...	—
Byes, 4; leg byes, 2; wide, 3	...	...	9	Byes, 2; wide, 1; no ball, 2	...	...	5
Total	...	...	108	Total	...	...	61

OBITUARY.

COLONEL CHARLES ELLIOTT, C.B., late of the Madras Artillery, who died on the 23rd July, 1888, at his residence in Cranley Gardens, South Kensington, aged 64 years, was employed on the Mysore Commission from 1851 to 1854, and on the Central India Commission from 1854 to 1862, and was created a Civil Companion of the Bath for his services during the Indian Mutiny. He was again employed on the Mysore Commission from 1862 to 1872, retiring from the Indian service in 1875, and in 1881 was appointed Inspector-General of Police at Barbados, which office he filled till very recently.

GENERAL JAMES FARRELL PENNYCUICK, C.B., R.A., of Bedford, died on the 6th July, 1888, in his 59th year. He entered the service as 2nd Lieutenant in May, 1847, was promoted to Lieutenant in June, 1848; Captain in September, 1854; Major in December, 1854; Lieut.-Colonel in February, 1861; Colonel in February, 1869; Major-General in November, 1880; Lieut.-General in July 1885, and General in January, 1886. General Pennyuck served in the Crimean Campaign in B Field Battery, 8th Company, 3th Battalion, from November, 1854, including the battle of Inkerman, siege and fall of Sebastopol (Despatches, *London Gazette*, 2nd Dec., 1854), receiving the Brevet of Major, the medal with two clasps, Sardinian and Turkish medals, and the Order of the 5th Class of the Medjidie. He also served in the Indian Campaigns of 1857-58, in 6th Company (Capt. Middleton's), 13th Battalion, including the relief of Lucknow by Lord Clyde, battle of Cawnpore on 6th Dec., actions of Seria Ghat, Chanda, and Sultanpore, siege and Capture of Lucknow, and action of Barree (Despatches, *London Gazette*, 25th May and 17th July, 1858), receiving the medal with two clasps. He also took part with the Expedition to China in 1860, Commanding S/14, and was present at Tangku, capture of Taku Forts, and surrender of Peking (mentioned in Despatches), receiving the medal with two clasps, the Brevet of Lieut.-Colonel and the C.B.

GENERAL SIR J. BRIND, G.C.B., late Bengal List, Royal Artillery, who died on the 3rd August, 1888; was first commissioned 3rd July, 1827, and served in the following campaigns:—N.-W. Frontier of India, 1854—Commanded the Artillery in the Expedition against the Momunds; medal with clasp.

Indian Mutiny.—Commanded Artillery of Delhi Field Force at siege of Delhi, the actions of Rooya and Allygunj, and through Rohileund campaign, including capture of Bareilly. Campaign in Oude.—Engagements at Modhypore, Russulpore, Mitowlee, Aligunj, and Biswah, and commanded a column at action of Mehndi, and in pursuit of Feroze Shah. Despatches, *London Gazette*, 15th December, 1857, 30th and 31st March, and 17th and 28th July, 1858, and 4th February, 1859. Received thanks of Government of India. Medal with clasp; Brevet of Colonel, and C.B. He was promoted to General, and Colonel Commandant, late Bengal List, 1st October, 1877.

THE PHYSIQUE OF THE SOLDIER AND HIS PHYSICAL TRAINING.

(PUBLISHED BY PERMISSION OF THE ALDERSHOT MILITARY SOCIETY.)

A LECTURE DELIVERED BY

COLONEL G. M. ONSLOW, INSPECTOR OF GYMNASIA.

I AM here this evening, in response to the courteous invitation of the Committee of the Aldershot Military Society, because I felt sure that they would not have requested me to read this paper, unless they considered the subject of it one which would be of interest to the members of the Society, and to the public at large. It is really a subject of the very greatest importance, and one of interest not only to soldiers, but also to civilians, and I cannot but feel diffident of my ability to adequately deal with it, or to place it before you in an interesting and practical manner. However, I can only claim your indulgence for all shortcomings, and I trust that if I succeed in nothing else, I may be fortunate enough to attract attention to the object at which I am aiming, viz., the physical improvement of the soldier, and to invite criticism of the method by which it can, I think, best be arrived at.

You will observe that in the *résumé* of my paper I have grouped the subjects under two heads. The first, the "Physique of the Soldier," is to my mind the more difficult to deal with, and would undoubtedly be better handled by one of the medical profession, on account of the physiological considerations upon which nearly all arguments concerning it should be based. It is also necessary to enable one to arrive at any sound and reliable conclusion concerning it, to be able to compare the physique of the soldier of the present with the soldier of former periods, and also with that of other countries; but, in the first instance, one is met with this difficulty, that until within the last few years no records of measurements, weights, &c., were kept, if these were ever even taken, which I doubt, and consequently there are but few data to go upon for purposes of comparison.

One gallant officer sitting before me, when talking the subject over with me, said "You know it would be very interesting if you could compare Tommy Atkins with the soldiers of the army sent by Pharaoh in pursuit of the Israelites in their flight from Egypt," and doubtless it would, but this I regret to say I have not succeeded in doing, and

indeed I find that it is only within the last twenty years or so that any reliable statistics have been collected, during which period the physique of neither the nation or the army can have appreciably altered.

There is an impression on the minds of many people that the English race is degenerating, and that the soldier of to-day is not what he was fifty years ago, and that at any rate the British Infantryman, is not physically the equal of the man who fought under Wellington; but this I believe to be erroneous, though we are unable by figures to arrive at any conclusion on this point; but there is one fact worth mentioning and it is, that the average age of the soldier in the army in 1803 was 27 years, and the standard height was 5 ft. 5 in. for the Infantry, and no chest limit; whereas, although the average age of the men now serving is certainly not more than 25 years, and the minimum standard height 5 ft. 4 in., there is a chest limit of 33 in., and the large proportion of 769 per 1000 of the men serving are 35 in. chest measurement and upwards, and 920 per 1000 are 34 in. and upwards; and the Inspector-General for Recruiting in his report for 1887 says "there is probably no army in Europe in which the physical qualities of the recruit are more carefully criticised both by medical and military authorities than in this country. In other armies the main care of the inspecting officer is exercised lest any recruit who might render service should be too easily rejected. In the British Army, every officer who successively inspects a recruit endeavours to find some point with which he can find fault." It is not, I think, unreasonable to assume, therefore, that with all these safeguards the "physique" of the soldier is probably now superior, at any rate equal, to that of eighty years ago.

The minimum height and chest measurement of our Infantry recruit compares very favourably with that of continental armies.

In France the minimum age is 20 years, height 5 ft. 0½ in., chest measurement 30·867 in.

In Austria, age 20, height 5 ft. 1½ in., chest 30·06 in.

Germany, age 20, height 5 ft. 1 in., chest no limit, but is considered.

Russia, age 21, height 5 ft. 0¼ in., chest no limit.

The English Infantry recruit is taken at 18 years of age, height 5 ft. 4 in., chest 33 in. Eligible recruits under 20 years of age between 5 ft. 3 in. and 5 ft. 4 in., and in other respects up to the above standards, may, if considered by the medical officer as likely to develop into efficient soldiers, be specially enlisted for the Infantry of the line.

By this it will be seen that though our age limit is lower, our minimum standard generally is higher than in foreign armies. Apparently in the early part of this century we did not bother our heads much about details of this sort, but took men more by height and appearance than by anything else, and were glad to get them. The following figures taken from the general annual return of the British Army for 1886, are of some interest, and confirm me in my opinion that the physique of the British soldier is still good :—

Of men serving with the colours in 1886, 901 per 1000 were 5 ft. 5 in. and upwards; 931 per 1000 were 34 in. and upwards chest measurement, and 834 per 1000 over 20 years of age. In the same year the number of men recruited was 39,409. Of these 28,286 measured over 5 ft. 5 in. in height, 25,617 were 34 in. and upwards chest measurement, and of these 12,028 were 35 in. and upwards, and 14,288 were over 20 years of age.

Now the average height of British lads of 18 years is from 5 ft. 5 in. to 5 ft. 8 in., depending upon whether the average is taken among the best favoured, viz., non-labouring communities, or among the artisan classes; so that as regards height there is nothing to complain of, and the fact that about two-thirds of them measured round the chest 34 in. and upwards cannot be deemed unsatisfactory, especially bearing in mind that nearly two-thirds of the whole number were under 20 years of age.

Now another fact that must not be lost sight of in considering this question of physique is that there are a number of lads (and a considerable number) who say that they are 18 years old, when in reality they are but 17, and in some cases only perhaps 16; therefore if these lads of under 18 fulfil the physical conditions required of those of 18 years and upwards, it is a strong argument in favour of my contention, that it is not so much the physique as the youth of the men we are now getting that we have to grumble about, if we have to grumble at all. I may here also mention that from reliable data it has been ascertained, that a range of growth of from one to two inches may be expected from 19 to 25 years of age; and the experience of Doctors Balfour and Lawson, well known officers, late of the Army Medical Department, as embodied in reports issued by them from 1860 to 1864, show that a recruit 18 years of age may be expected to grow 1 in., increase $1\frac{1}{2}$ ins. in the chest, and about 10 lbs. in weight, before he reaches the age of 23. Other observers have arrived at like conclusions. These data were fixed when physical training was almost unknown in the English Army, and certainly had done little or nothing towards improving the soldiers' physique.

Both from what I have gathered in conversation with men well capable of judging, and from my own personal observations, I am convinced that at the present time the physique of the soldier is as good, if not better, than in the past. Look at what our men did in 1880 in the march under Roberts from Cabul to Candahar, in a foreign climate, and in hot weather, 232 miles in 14 days, an average of $16\frac{1}{2}$ miles per diem: does that look like deterioration of physique? But this march was not performed by immature lads, but by seasoned men; therefore I say our material is good enough, if only we give it time to mature, and train it properly while maturing. There is, however, one element of danger threatening which it is incumbent on us to guard against, and it is this—The tendency of the population of the country is to gravitate towards certain centres, to seek employment in large towns, and this must, I fear, have in time a very deteriorating effect on the physique of the nation. There are in England now two town-bred children to one country-bred child, and the proportion must steadily increase year by year.

The Director-General of the Army Medical Department (Sir Thomas Crawford), in a paper he read to the British Association, stated "that he believed the recruits taken from large towns showed inferior physique to those coming from rural districts," and it is a fact that the number of rejections has increased 43.91 per thousand of men seeking enlistment in the last 26 years, which is rather ominous, though this may perhaps be partly accounted for by extra care on the part of the medical officers inspecting, and may be partly attributable to agricultural depression and bad trade driving many men to enlist that would not otherwise offer themselves, and which enables the recruiting authorities to be more particular as to who they accept; but it must also I fear to a certain extent be attributable to a deterioration in the physique of the town-bred populations, and this is a very grave matter indeed, and one which if it goes beyond a certain point must seriously affect us as a nation. I mention this as going to show that it is imperative on us to consider, and will become so more and more as time goes on, what we are to do, and what measures we should adopt to improve the material we get, and to put it into a condition to meet the requirements of military service.

THE FOOD OF THE SOLDIER.

Now it occurs to me that in dealing with this subject of the development of the young soldier, the improving of the material, one must before going into the question of his training, ask, does he get enough to eat, and a sufficient number of meals, or rather perhaps are the hours at which he is fed well chosen? The answer is to my mind "No!" In the first place the present ration was fixed at a time when there were at least 90 per cent. of old soldiers in the ranks, many (alas too many) of whom lived almost as much on drink as on food, and who certainly did not consume their whole ration, and the young soldier in those days got his own share and a portion of the old soldiers' as well, and probably got as much as he required; but now owing to the annual large influx of growing lads into the ranks, ready to devour all their ration, and as much again if they could get it, it is extremely doubtful whether the food they are allowed is sufficient to supply the nourishment necessary for immature men.

Now about the hours at which he gets his meals; 8 o'clock for breakfast and 1 o'clock for dinner is all right, but 4.30 for tea, if you do not give him another evening meal, is all wrong. It simply means that he goes from 5 in the evening until 8 the following morning, *i.e.*, 15 hours without any sustenance, at a period of life when the waste of tissue is greatest and requires constant renovation. If you can't give him another meal, at any rate let his last one in the day be later. I know one of the arguments against increasing the rations, is that it would cause a material increase in the army estimates, and that the British soldier is better paid than any other, and that if only he would spend in purchasing extra food what he spends in drink, that he could get a substantial meal every night of his life. This I grant, but the fact to be recognized is, that a very large proportion of

men of the classes from which we mostly get our recruits will, if they have a sixpence in their pockets, go into a publichouse rather than a cookshop, and will buy drink rather than food. The gin-palace offers attraction in the shape of light, warmth, and convivial company which the other place does not.

This food question is one that is of course more within the province of the medical profession to deal with than mine, but it is so important a factor in the question of the ultimate development and staying power of the man that I cannot pass it by unnoticed.

We now come to the second heading—

PHYSICAL TRAINING, ITS OBJECTS.

I must impress upon you, gentlemen, that all the remarks I make on the subject of physical training apply more particularly to the Infantry soldier, as I consider that once a Cavalryman or Artilleryman is dismissed his recruits' course of gymnastics, the work he gets is sufficient for all practical purposes to keep him in sound condition; and sweeping out stables, wheeling barrow loads of manure, exercising and grooming one, and perhaps two horses, cleaning and lifting a saddle on and off a rack, and performing the many other ordinary duties that fall to the lot of Cavalry and Artillery soldiers, renders anything further unnecessary.

One of Napoleon's military maxims was "that the first quality of a soldier is the ability to support fatigue and privation, physical courage is only the second." This shows the value he put upon physical strength. A more ancient authority, Vegetius, said—"It is of much more importance that a soldier should be strong than that he should be tall." Bodily strength, activity, stamina to enable a man to endure privations and protracted fatigue, are as essential to the soldier now as in the days of Xenophon, Cæsar, or Napoleon. How are these to be obtained? I reply by a scientific system of physical training, regulated by the fitness of those who undergo it, progressive in character, and calculated to develop the body to its full power and perfect conformation.

The necessity for a properly regulated system of physical education is recognized and acted upon by most continental nations both for their soldiers and in civil schools, but it is of comparatively recent years that it received any attention in England, and we in the army may, I think, justly lay claim to having taken the initiative in the movement, though we are very far yet from realizing its great importance from either a military or a national point of view. It is about eight-and-twenty years ago that the question was first seriously considered by the military authorities, and shortly after a batch of non-commissioned officers under Major (now Major-General) Hammersley, the father of army gymnastics, was sent to be trained at Oxford by Mr. Maclaren, and on completion of their training, and the building of the Gymnasium in the Permanent Barracks here, the military system of gymnastic training was introduced into the army.

To the ability, energy, and patient labour of General Hammersley

is due the sound establishment of the system throughout the whole service, and very few have any idea of the difficulties caused by ignorance and prejudice which he had to contend against, and I regret to say that these same causes of obstruction are occasionally to be met with in the present day. I have come across now and again officers who have had an extraordinary antipathy to the Gymnasium and everything connected with it, and who hated their men attending for instruction. They have been few and far between, but still I have met with them, and I have always attributed this antipathy to their not properly understanding the unquestionable benefit systematized exercise is to a man, and the impossibility of the human frame ever approaching full and uniform development without it.

There are two objects to be attained in the physical training of the soldier. The primary one is to make him strong, active, enduring, and hardy; the secondary one is to teach him to apply practically the activity, self-reliance, and strength, that the first has given him, to enable him to overcome obstacles and difficulties he may encounter in the field, and to use with ease and skill the weapon with which he is armed. Now to make a man fulfil the conditions which are the object of the first, it is necessary to so work him that the whole, not part, of his muscular system is exercised. Even supposing a man has had opportunities of indulging in the manly games for which this country is famed, he still, to become uniformly developed, requires systematized exercise. For instance, by playing football, the lower limbs only are developed. By rowing, lower limbs and loins principally. Racquets, lower limbs and right arm moderately. Cricket, lower limbs and right arm principally. Walking, running, jumping, lower limbs entirely.

All these games, grand as they are, and I like to see every fellow play them, only partially develop a man. They result in irregular instead of harmonious improvement, certain parts of the body being cultivated and developed to the exclusion of others. Then there is the man recruited from the labouring classes. You will find him more or less developed in those muscles that have been most used in the work by which he has earned his bread, and in the great majority of cases, to the detriment of the others. Our business, then, is to keep in good condition what is already so, and to improve and supply what is bad and deficient. To enable one to comprehend the necessity of systematic exercise one must understand its effect on the muscular system. Maclaren briefly defines exercise as being "muscular movement produced by muscular contraction by which every motion of the living organism is accomplished." Our muscular system is composed of voluntary and involuntary muscles. Our frame is composed of myriads of atoms, each of which preserves its vitality for a given period, then dies and is separated from the tissue of which it is a part, and is eventually cast out by the organs of excretion. Exercise, that is contraction of the voluntary muscles, greatly expedites this process of disintegration, and every muscle put in action causes the decay and death of certain of the tissues composing it. Now were it not for some reparative process, this decay and consequent loss of tissue would of course cause diminution of size and power, but in the nutritive

system is the necessary reparation found, and by the conversion of our food into blood, and by its constant and never failing supply, the necessary material for making good what has been wasted is pumped by the heart to every part, to every tissue of the body, and through the medium of the blood what is required for renovation and further increase, is carried and deposited throughout the entire frame. By a beautiful and never failing law, during the period of growth, and until the limit of the individual capacity of development is reached, the supply of tissue in a healthy body invariably exceeds the decay, and the body in consequence is constantly being built up and enlarged. From this it will be readily understood that every muscle requires to be put in constant action to cause the necessary and uniform disintegration of its atoms, without which its proper growth and increase is retarded, if not stopped altogether, and this can only be ensured by a carefully arranged system of physical culture.

But not only is the soldier required to be strong, but he is required to be healthy, hardy, and enduring. These are qualities that directly depend more upon sound organs than upon physical strength.

Hear what Professor Aitkin says in his admirable book entitled the "Growth of the Recruit." "All the parts of the organization of man are connected and correlated together, so that with the increased or decreased dimensions of the whole body, or any particular part of it, certain organs are also increased or diminished or modified, and modifications which arise during the earlier stages of growth tend to influence the subsequent development of the whole man." Every time you put in motion one of the voluntary muscles there is a corresponding action of some involuntary muscles in connection with it, and these are the muscles of the digestive organs, and of the heart, lungs, kidneys, &c., so that the proper condition of these, their health and capacity to rightly perform their functions, depends greatly upon the impulse they receive from the voluntary muscles. Put the organic system into a high state of health and vitality, and you enable the body to resist the evil effects of extremes of heat or cold, or other deleterious influences, and you get the sound, hardy, and enduring man.

Most continental nations fully realize the necessity of making the soldier active and strong, and it may not be out of place before examining our own system to take a glance across the water and see what is done by the different countries of Europe.

GERMANY.

We will take Germany first. With the Germans as with some others, physical education is not only a military but a national question. The founder of it was F. Jahn, who attributed the crushing defeat of the Prussians by the French at Jena, in 1806, to physical defects on the part of the former, and he made it his business to prepare the German youth for the defence of his country by improving his bodily powers. He it was who laid the foundation of the German Gymnastic Union, now composed of 4,764 societies, and numbering

400,000 associates. At one time these societies were suspected of Socialistic tendencies, and some of them were suppressed, and Jahn was locked up, only however to be shortly set at liberty again, when the movement made great strides.

In 1842 gymnastics were declared to be necessary in all educational establishments, and schools were formed to train masters of gymnastics, one being the central school in Berlin. A section of this school is set apart for the instruction of officers commanding regiments. Under officers are also trained there, and every regiment has now to send one officer yearly, so that in every battalion there are a number of officers capable of conducting the physical training of their men. Great weight is attached to practical or "applied gymnastics" in the German Army, and the men are continually exercised in them throughout their whole service. No one can deny the fact that physical superiority (the result to a great extent of their excellent physical training) was one of the causes that enabled the Germans in '70-71 to alter the verdict given at Jena.

RUSSIA.

We first hear of Gymnastics in Russia in 1785, and some few years after the Emperor Nicholas ordered gymnastic exercises to be practised in the army, and in 1839, at the great manœuvres near Borodino, gymnastic experiments were tried in the presence of the Emperor, with which he was so pleased that he decorated the Director of Gymnasia with the Order of Stanislaus. However, the system does not appear to have flourished much until after the Crimean War, when on the termination of that campaign, so unfavourable to Russia, it was established in every military school and corps, and it has been increased and improved upon steadily ever since. All recruits are under instruction in peace for four months, and in time of war for two months. The system is progressive, and commences with the simplest exercises, advancing by degrees to applied gymnastics, viz., the overcoming of obstacles, escalading walls, &c., to which they attach very great importance. Here, again, I must draw attention to the fact that the necessity for cultivating the physical qualifications of the soldier was not fully recognized until after an unsuccessful war.

FRANCE.

In France gymnastics were first introduced by a Spanish Colonel Amoros, at the beginning of this century, and he founded a school in Paris in 1827. He did not succeed, however, in enlisting any public interest. In 1847 an attempt was made to establish a system in the army, but no good results were arrived at owing to imperfect organization.

By the exertions of Eugene Pay, Founder and Director of the "Grand Gymnase de Paris," in 1869 the Government were induced to issue a decree making gymnastics compulsory in all schools, but the war of 1870 upset everything and no good came of it. At the termination of the war, however, France awoke to the necessity of taking measures to cultivate a strong race of men, and to toughen and improve

their muscular fibres, and throughout the country gymnastic societies were founded, now numbering 650, as compared with 10 in existence prior to the Franco-German War.

In the spring of 1878 conferences were held in Paris under the presidency of Mons. Victor Hugo, on the "Education and Instruction of Youth," the outcome of which was, that the Government were induced to make gymnastics compulsory in all schools. The results are considered to be most satisfactory, and immense strides have been made in the physical training of the French.

Here, again, we see conviction on this all important question brought home to the mind of a nation by a great military disaster.

AUSTRIA.

In Austria we find the highest importance attached to the physical education both of soldiers and civilians, it being compulsory in all schools; but as late as 1848, the educational spirit dominant in the country was absolutely hostile to it, and it was not until the year following their humiliating defeat by the Prussians that a proposal made by one Dr. Steiger to establish a compulsory system of physical training in all educational institutions, was entertained by the Government and put in force the following year, since which time it has rapidly and steadily grown to large dimensions.

It would be wearisome to go through the remainder of the list of countries, but it will suffice to say that in Italy, Norway, Sweden, Denmark, and Switzerland, systems all more or less similar obtain, and physical culture is looked upon as necessary as, and also as being an aid to, a man's mental education. Why we, with such a consensus of opinion in favour of it, do not institute a system of compulsory physical education in our board schools, I am at a loss to understand, but with this I have nothing to do, and allude to it only to emphasize the necessity of a high physical training for our soldiers, for if it is necessary for soldiers of continental armies, all of them men who have had a preparatory training while at school, how much more must it be necessary for our men, recruited as they are from a population that has no such advantages.

OUR OWN SYSTEM OF PHYSICAL TRAINING.

I have found when enquiring into the military systems of the different countries I have enumerated, that the soldier's physical training commences immediately he joins, and it is continued to the end of his service with the colours. There is no such thing as a man commencing a course of gymnastics and being taken away in the middle of it for musketry or military training, to return after an absence of perhaps weeks to begin again, having forgotten much he has been taught, and having lost much of the benefit he may have derived. No, he starts with it at once, and it continues systematically and progressively to the day he is passed into the "Reserve," and he therefore gets the full benefit out of it, and neither the time, labour, or money expended on it is wasted. Now, what is our system? By

our regulations the "recruit" does not commence his course of gymnastics until he has completed his recruits' drill and been put through the recruits' course of musketry. What is the result? Why he is a trained soldier in every other but a gymnastic sense, and when he does join for instruction he is liable to be withdrawn at any moment for military training or for the annual course of musketry, and he is grudged by his commanding officer and adjutant because he is not available for parades, guards, field-days, &c., and the consequence is, that the gymnastic training is viewed by some officers with disfavour, not on account of any demerits of its own, but for the reasons I have mentioned. There is another disadvantage in not conducting a man's gymnastic training concurrently with his recruits' drill, and it is this, that "drill," *per se*, does little or nothing to supple and strengthen a man, but as regards certain muscles rather the reverse, and the present extension motions won't do much good in that direction either; so for the first three or four months after a man joins, you may say that next to nothing is done to give him either strength or flexibility of limb.

In the drill necessary to prepare him to take his place in the ranks you teach him to walk uprightly and stiffly, to look straight to his front, and to hold his arms rigidly by his sides. In fact you constrain his every movement, and you deny to the trunk of his body and to his upper limbs any exercise or freedom or movement whatever, thereby stopping that action of the muscles which I have endeavoured to point out is so necessary for their development, and this at a period of his career when you should be using your best endeavour to encourage it. The recruits' course is supposed to last three months—say 90 days—from this you have to take at least 12 Saturdays and Sundays, *i.e.*, 24 days, which leaves 66 working days, and from this again has to be deducted a certain number of absences entailed by a man being in hospital, medically excused, or in the guard-room, &c., amounting probably to another 12 or 14 days, so that the actual number of lessons that a man gets is most likely not more than 50 or 55. It is obvious, therefore, that every hour he attends must be devoted to the one object of making him strong and active, and in teaching him to co-ordinate his movements, a thing many men cannot do; and there is absolutely no margin left for making what should be the next step in his physical training, that of teaching him how to apply practically what he has learnt. It is, however, a great point gained to have partly attained our primary object—that of making him stronger—and one must have constant opportunity of observing the beneficial effect even under our present system that the training has upon men to fully realize its importance.

Instances of men not showing a decided improvement as regards development, power, and activity, are rare, and the following figures I think prove conclusively that great good has accrued to them generally.

Among the 15,504 men that completed their full course of training during the past year in the gymnasia in the United Kingdom, the average increase was:—Weight, 2½ pounds; chest measurement, 1½

in.; forearm measurement, $\frac{1}{2}$ in.; upperarm measurement, $\frac{3}{4}$ in. So you see that in less than three months these boys increased in chest girth almost as much as Doctors Balfour and Lawson gave them five years to do in, before the gymnastic training was introduced. Does not this speak for itself? I could give you any number of cases in which the increase has been simply extraordinary, but will confine myself to one or two of the most wonderful on record.

Among the 12 non-commissioned officers who went to be trained at Oxford under Major Hammersley, the average increase in $7\frac{1}{2}$ months was 10 lbs. in weight, $2\frac{1}{8}$ in. in chest, $\frac{3}{4}$ in. in forearm, $1\frac{1}{4}$ in. in upperarm, and one of the number aged 19, increased from 33 in. to $37\frac{1}{2}$; and another aged 24, when he commenced measured 35 in. and when he finished was 40 round the chest, an increase of 5 in. in a little over 7 months. It is needless to say they required new tunics, &c., and I hope the country paid for them; but imagine what these figures mean. They represent not merely an increase of muscle, but an expansion of the osseous framework upon which the muscles lie, an enlargement of the chamber of the heart and lungs, thereby providing these with more space for functional activity and growth.

I have seen curious specimens join, men who have never used their limbs in their lives, who have never properly inflated their chests, and who, though they have been passed as medically fit, when put to the test of physical work proved practically useless as soldiers, but in these rare and extreme cases I have invariably found that all that was required was careful training, and extra time in training them. I remember one case of a man who could not jump over a stick two feet from the ground, and could scarcely bear the weight of his own body when hanging on a rope. The officer commanding his regiment tried to get rid of him, but he was ordered to be kept at gymnasium for another course of instruction, and at the end of eight or nine months was so improved that there was no further talk of discharging him.

Up to the present I have spoken chiefly of gymnastics, because it is unfortunately almost the only physical training the soldier now gets, excepting "Running drill."

Now "Running drill" is doubtless highly important, and every soldier worthy the name ought to be able to run his thousand yards in seven minutes without being too distressed at the finish to use the bayonet if necessary, but only very gradual and continuous training will get him into such condition, and too much care cannot be taken in exercising the men at this drill. For instance, if you take a man or boy, whichever you prefer to call him, in the early morning to run round and round the barrack square until he is sick, you are doing him serious and perhaps permanent injury, and laying the seed of future disease. After just rising from his bed his muscular system is relaxed, and not ready to withstand such fatiguing exercise, and his heart and lungs are unprepared for such quickened action, for such increased rapidity of respiration, and to aggravate the mischief this is all done on an empty stomach, after a fifteen hours' fast.

Don't misunderstand me, and imagine for a moment I wish to

suggest that this is the manner in which running drill is usually conducted by regiments, but as I have known cases where greater discretion might certainly have been shown, I wish to call attention to the danger attending the absence of proper care, and also I object to the practice of running young soldiers on an empty stomach. Run him in the forenoon or afternoon, and run him to music, and give him something to think about while running, in the shape of simple changes of formation, &c., and you will attain your object without unduly fatiguing him.

When once he is dismissed his recruits' course of gymnastics, nothing more is now done regimentally in regard to keeping up or improving his strength, and he may or may not attend at the gymnasium for the drilled soldiers' course that he is supposed to annually undergo; one reason being, that he is very likely quartered in a place where there is no school, or his regiment is broken up into detachments and he can't be spared, the duties being so heavy, and for various other reasons.

Now, in my humble opinion, this is a grievous and deplorable mistake, and if not remedied we shall one day pay very dearly for our shortcomings in this respect.

Reform is needed.

There, are, however, many difficulties in the way of bringing about a reform. One is to convince men that it is necessary. The only way I can hope to do that is by endeavouring to get them to think over the question, and to give them digestible food for thought, and a great step in the right direction will have been made if only a deeper interest in the subject can be aroused in the minds of officers, and, if they will only give the subject the consideration it deserves, they cannot fail then to see its importance. The next difficulty is, that mystical body entitled the "Treasury," the stumbling block of all practical reform, the rock upon which the good ship "Efficiency" so often founders. Many a good practical scheme is blocked and comes to naught because of the cry "there is no money," but it does not do to be daunted by obstacles of this sort, and the only way is to hammer on, and in time one generally gets a portion, if not all, that one wants. But the great thing is to know what you want, and I am thankful to say that I do know what I want, and it is this—I want to see our present system altered, improved, developed. I want to see the fact recognized that it is no use to drill a man, no use to give him a costly arm of precision, no use to teach him to shoot, in fact no use to teach him anything, unless you first make him strong, active, enduring, and self-reliant. Physical strength, endurance, and discipline are the first qualifications of a soldier, the foundations upon which the whole structure of his efficiency is built.

The following is a sort of system that I should like to see established, without of course entering into minute details, as time will not admit of my so doing, and I do not lose sight of the fact that time, money, and many preparatory measures are necessary before what I hope to see one day authorized can be put into practice; but the sooner the ball is started rolling the better, and I hope and believe

that it has begun to move in the right direction, and for this we have to thank the General Officer Commanding the 2nd Brigade, whose warm co-operation has most materially assisted us in overcoming many difficulties.

I should like to see in all barracks of any size good large drill sheds erected, fitted with some portable apparatus, in which the soldiers' training could be carried on at all times, and without regard to the weather. I should like to see every regiment in the service to be obliged to send one officer and two non-commissioned officers to be trained in the Head-quarter School annually, so that in a short time there would be everywhere a sufficient number of regimental officers and non-commissioned officers capable of undertaking the instruction of their men. I want every man on joining, whether his regiment or his *dépôt*, to be at once taken in hand, and, *pari passu* with his ordinary drills, receive one hour and a half's physical training every day of the week, Saturday and Sunday excepted; three-quarters of an hour in the forenoon, and the same in the afternoon; this training to comprise elementary gymnastics proper, free movements (not the present extension motions), the rapid march—170 paces to the minute—the high balance step, running drill, practised differently to the way it now is; and when the men are ready to carry arms, the free movements to be performed with the rifle. Then as the men become proficient, the different squads should be massed, and the various series of exercises performed to music. When first this proposition was made, considerable doubts were entertained by some as to whether the correct performance of these several exercises to music by any large body of men would be found practicable. This has been put beyond question by the Officer Commanding the 1st Battalion Northamptonshire Regiment, which battalion does a variety of free movements, with and without the rifle, to music, in admirable time and with great precision, and H.R.H. the Commander-in-Chief expressed his high approval of the practices when he saw the regiment perform them on the occasion of his last visit here, and authorized their adoption for trial generally in the Division.

So much for the recruit's training. By this time he should be fairly active, supple, and strong, and he should be in a condition to be instructed in the practical application of the exercises he has been taught in the gymnasium. For the use of the trained soldier there should be in every barrack square "walls" similar to those which, on my recommendation, were built outside all gymnasia last year, with the object of teaching the men to escalate by "mutual support," and there should always be ditches for them to jump over, banks for them to jump off, bars for them to vault over, with first one hand and then the other, sometimes to be taken in their stride when at the double, and all these exercises to be practised with and without the rifle, and there should be issued to every regiment a certain number of old rifles for this purpose. The changes should be rung on these several exercises, and every drilled soldier should receive two hours instruction a week throughout the year. If this were thoroughly and intelligently carried out, I am as convinced as that I stand here, that the improve-

ment in the physique, activity and self-reliance of the men would be markedly apparent in a very short time. Remember also that if all this is done in a proper manner, the men can be trained to work and drill with great rapidity and precision without loss of cohesion, as each man's individuality will be developed, and his intelligence sharpened, and what is equally important, his interest in the work will be enlisted, and the dull monotony of the present routine relieved.

Doctor Warre in his able lecture here last month, in speaking of minor tactics, said—"These again have drill as their ultimate foundation, and depend for their success very largely upon its perfection," and I say that *it* again depends largely for *its* perfection upon the physical training and condition of the men.

Then there is another thing that I cannot help thinking is a very great mistake, viz., that more encouragement is not given to the Infantry soldier to become proficient in the use of the bayonet. I have heard it argued that he should never actually defend himself with it, but should rely on the quick shooting power of his rifle, if so, why give him a bayonet; but if you do give one, you should teach him how to use it, which I maintain you don't. I think that the Government ought to give prizes for skill in the use of the bayonet on somewhat the same lines as prizes for swordsmanship are given in the Cavalry, and the winners of regimental and company prizes should be allowed to wear crossed bayonets on the arm in gold or worsted. You may rely upon it that it would be attended by very good results, and apart from the benefit to the individual, we should not see, as we now do, more Cavalrymen and Artillerymen enter for the bayonet competitions at the several tournaments and athletic meetings than Infantrymen.

As I have previously said, more officers and non-commissioned officers qualified to instruct are required in every battalion before the system I advocate can be established, and before these could be instructed it would be necessary to build us a large, properly planned Head-quarter Gymnasium and "School of Arms" here, as in the wretched place we have at present (one of the worst in the Kingdom) we have not room to train in the way I should wish the numbers now attending, and it would be simply impossible to take on many more. Among other innovations I am anxious to have an officer of the Army Medical Department specially detailed to give a series of very simple lectures on anatomy, the muscular system, the circulation of blood, &c., and a few practical lessons in the art of bandaging a fracture or dislocation in the event of an accident, for the benefit of the officers and non-commissioned officers qualifying as superintendents and instructors, so that they should know what to do, and what not to do, in cases of emergency, until medical assistance could be obtained. But a quiet room must be provided before this can be done, as it is impossible to teach men subjects of this sort in a small building where from 1,500 to 1,800 men are trained in the week.

I am convinced that a system of training of the character I have described is a great and pressing want in the service at present, and this is admitted by many officers of high position and great experience, and I may say that I have not met with a single officer who has given

the subject any thought, with whom I have discussed it, who has not admitted its necessity, although perhaps not agreeing altogether with me as to its practicability, or as to the method of carrying it out; but that sooner or later it will be accomplished I do not for a moment doubt.

If these few words of mine make any favourable impression on the minds of some of those who have hitherto not carefully thought over the question, or who may not for reasons of their own be in favour of what I advocate, or who have considered it one of secondary importance, I shall be more than repaid for the trouble I have taken in preparing this paper. Depend upon it, that (other conditions being equal) at the critical moment, when victory is trembling in the balance, the scale will be turned in favour of the commander whose troops are the most physically fit, and it is false economy on the part of the nation, and cruelty to men, to expose them to the hardships and privations of war, to the fatigues and exhaustion incidental to a campaign, without previously fortifying their constitutions, and storing up for them that reserve of vitality, strength and endurance upon which they will most assuredly have to draw, and without which they must inevitably break down.

A few more words and I have finished. As I said at the commencement, we have, I believe, in our young soldiers a splendid material to work upon, and, as we know, it is a costly one; let us therefore economize it. At the early age we take them they can be usefully trained, but we have it on the highest authority that no man under 20 can be regarded as an efficient soldier, or fit for active service. We should, therefore, train him very slowly and progressively, asking him to do nothing beyond his powers of endurance, and we should gradually effect the adaptation of his heart and lungs to the unaccustomed labour they are called upon to perform. Lastly, we should encourage him to play cricket and football, and all other manly games, to bathe and learn to swim whenever an opportunity offers, and by every means in our power let us wean him from drink and dissipation by offering him strong counter-attractions in the shape of wholesome amusements of an evening in barracks, and we should make the best arrangements we can to enable him to get a square meal at night at the lowest possible price, and rest assured that the reward of such exertions will be less crime, higher morality, and greatly improved physique.

If we only go the right way to work, I can see no reason why it should not be said in the future, as it has been in the past, that the British Infantry is the finest in the world.

ON TAKING OVER A BATTERY IN INDIA.

BY

CAPTAIN E. F. BECHER, R.A.

HAVING on more than one occasion had to take over a battery, I have felt the want of having something to remind me of various points I should look to; I am therefore, whilst the subject is fairly fresh in my mind, induced to make the following notes, in the hopes that it may be useful as a reminder to senior officers, and as a guide to junior ones, who by the exigencies of the service are sometimes obliged to be sent to take over a battery, their only aid being perhaps a sergeant as inexperienced as themselves. I will here take the opportunity of advising everyone to protest against this sergeant being detailed for any duty until the battery arrives. By R.O. in India, No. 8 of 1887, both the officers assuming and giving over command of batteries should be relieved from all other duties, whilst doing so. The above-mentioned order should be carefully read and be always at hand for reference during taking over, as it contains much useful information.

It must be remembered that it is not at all necessary to exact the pound of flesh—there must be a certain amount of give and take; a very slight knowledge of the battery and its C.O. will be the key note of the whole business. Barrack damages are very slight in this country, and we are treated with a fairness which is very pleasant. On the other hand, if the taking over detects that he is being “*done*” in any way, then I would say claim your pound; by “*done*” I mean that a handspike has been made up out of a rough bit of wood and put away more or less out of sight, *e.g.*, behind a wagon, or some worthless bazaar articles in the place of the proper pattern. Some Q.-M.-S. think it shows their cleverness to do things of this sort, even when the above-board expenditure would not cost above a few rupees against the barrack damage fund. If any Q.-M.-S. may happen to read this, I say, report at once any deficiency to your C. O., and take steps to either replace it properly at once, or acknowledge it as deficient in handing over, it must be found out sooner or later, and your reputation as Q.-M.-S. is not enhanced thereby, and you do not benefit your C.O.

I will for the sake of clearness imagine the case of a C. O. bringing out a so-called battery to India. The following have to be taken over on arrival at his Indian station :—

(1) Men (European and native) and kits, (2) horses and bullocks, (3) harness, bullock gear, line gear, (4) guns, carriages, and ordnance stores connected therewith, (5) artificer's tools and Q.-M. stores,

(6) barracks and barrack stores, (7) tents and tent equipage, (8) institutions, (9) documents, (10) books, (11) funds and money belonging to them.

The battery to be taken over will, we will say, be on the peace establishment, consisting of 6 guns, 6 ammunition wagons, 2 store wagons, 1 store cart, 1 forge. The details of which will be found in the Equipment tables; the latest at present published are 1886. To this edition I allude.

1. MEN.—The Europeans will consist of a certain number of men who have not served six years in India, volunteers to remain in India, &c. The natives will consist of 8 native drivers, 10 store lascars, 2 tent lascars, 10 artificers, 76 syces, 2 bullock drivers, and conservancy establishment. The Europeans should parade with their kits laid out and small books in their hands, as also should the native drivers. A native driver's kit is laid down in R. O. in India 33 of '86, and I. A. C. Clause 20 of Feb., '88, and on enlistment the C. O. receives for each man 30 rupees to provide a full kit, if they are not fully kitted the balance of the 30 rupees should be accounted for by the giving over. The lascars and bullock drivers should parade in their cloth uniforms. Some battery syces have a uniform, if they have they should parade in it, but this uniform is only a private arrangement. All the natives, except the native drivers who have ordinary account books and the conservancy establishment who have none, should have their Service books open in their hands, so that it can be seen that on transfer they were signed by the late C.O. These Service books should be taken away from the natives before dismissing the parade, and always kept in the office; all should also be asked if they have any claim against their late battery, and make sure that the natives, especially the native drivers, understand the question. Of course they are taken over by a nominal roll. Some men may be away in hospital or on guard, they should be seen if possible by an officer, to enquire if they have any claims; of course in 99 cases out of a 100 this might be unnecessary, but in the 100th such a lot of trouble might be caused by some claim cropping up afterwards, that though a little extra trouble, it is always safest to make sure that every man has been asked. So much for men and kits.

2. HORSES.—The horses will be in roomy open stables, the establishment is 110, there are also five bullocks for line duties; the taking over should have the horse book with him and compare the description of one or two; the horses can be counted as they stand, the giving over should acquaint the taking over of any horses which have any peculiarities; it is a very common thing for a horse to get the reputation of not being able to be ridden, which in most cases is quite fictitious, and of course when the late owners of the horses have gone away there is no one to refer to.

3. HARNESS, BULLOCK GEAR AND LINE GEAR.—It must be borne in mind that the date for the annual condemning and change of harness and line gear is December, January or February, as the Commissary of

Ordnance may notify, and the condition in which they are accepted must depend on this; for instance, if there were an amount of unserviceable articles, and it was just after the condemned articles had been replaced, I should refuse to take them over, but if it were a month or so before the annual condemning, then there is no objection to taking them over, provided the majority of the articles are time-served; the time each is supposed to last is to be found in the Equipment tables, but it is extremely unlikely that a battery is likely to get into this condition unless under exceptional circumstances, such as just returned from service, &c. The harness is detailed in the vouchers, according to the different parts, for instance—*Pieces, buckling, 94*. But if the Equipment tables are referred to, page 3, Establishment, we find there the establishment is 29 double sets of lead and 18 of wheel harness = 94 sets, thus with other parts; hence it is only requisite to see the harness complete on the horses and count the number of sets. The best way is to parade the battery hooked in, not forgetting the centre cloak straps; the harness belonging to absent horses should be laid out on the ground in its proper place, and *not* in skeleton order. Harness wrappers should also be brought out and laid out near the set of harness each belongs to; the Nos. 1, drivers, &c., should then be ordered to take charge of it, and take it away and hang it up in its proper place in the harness room; after a little time, the taking over should go round and satisfy himself as regards the quality, paying particular attention to the state of the panels, as the amount of serge allowed for repair is very small, if they were not in good condition, I would not take them over; in the case of an officer being sent on in advance to take over, the harness rooms should never be locked up. At the same time as the battery paraded hooked in, spare hames and hame straps and other similar articles should be taken over and put in the Q.-M.-S. store.

We now come to a division of harness and saddlery called *miscellaneous articles and stable necessities*, which includes all that is usually called line gear. Some of these articles will probably not be placed on the voucher, I allude to baskets, country; brooms, country; cloths, dusting; cordage for tying up hay; and others. I should insist on them being put on, unless some regulation can be shown to the contrary, and of such regulation I am ignorant; as I have said before, have everything on the vouchers except various odds and ends such as spare buckles, screws, &c., of which there is always a surplus.

A certain number of the articles under the above heading will be found hung up in stables or on the horses, where they can be counted, I refer to loops, heel rope, leather; ropes, head, with loop (this includes the hook) 7 feet; ropes, heel, 15 feet; also bridles, watering, parts of; bits, T, bridoon; and reins. The spare of the above, and all other articles should be laid out. Look particularly at the *bags, canvas, coarse, painted, for, &c.*, they are very likely to be in holes, especially the one for gram, as rats often eat them. Of course the blankets should be open and laid out, canvas nose bags also open. I have known objection taken because a few brass eyelets had dropped out, but if the nose bags were otherwise in good condition, this is barely a cause for objection.

The rough rider should inspect his gear, the teeth of the clipping machines should be looked to, the straps for bags, canvas, &c., should be the correct length.

Now for *baskets, brooms*; they are obtained (55) every three months, *i.e.*, on 1st January, 1st April, 1st July and 1st October, from which data the number to be handed over can be calculated, but they are very rotten concerns, as a rule if I were handing over, I would give a generous supply of new ones as they are very cheap. *Cloths, dusting*, known as "*pani capra*," are supplied (220) on the 1st April and 1st October, the number to be taken over and condition can be judged from this. Cordage for tying up hay, 118½ yds., can be obtained every three months, *i.e.*, on the 1st April, and so on; the *couples, trace*, should be laid out now and not be allowed to remain with the guns. The *harness wrappers*, though under this head, have been taken over with the harness in the harness room.

A certain amount of line gear is borne on the station store ledger, and not on the equipment ledger of the battery; the station store ledger should be at hand, and the remain at date checked; the station stores are not handed over on vouchers, but the ledger is handed with the receipts and delivery vouchers, which should be checked with the ledger. As an example, supposing that on the handing over vouchers of the battery equipment ledger there were 50 bridles, watering, parts of, reins, and also 50 were shown in the station store ledger, 100 in all should be produced; the handing over vouchers and station store ledger being quite distinct. The station store ledger should not be taken over until all vouchers are entered up to date, the remain entered in pencil, which should then be checked, there will not be many vouchers, so do not take it on trust without checking. All the above having been found correct or otherwise, those in use should be handed over to the Nos. 1, *making them sign for them at the time*, and the remainder taken to the Q.-M.-S. store.

Do not cause unnecessary friction however about these baskets, brooms and cordage, if you can get on with what is handed over, though perhaps not quite up to the mark, raise no question; when friction is set up it is very unpleasant for both parties, and it is a physical law that friction generates heat. The *bullock gear* should be laid down near the bullocks by the bullock drivers, in whose charge it is. There is another section of harness and saddlery, *viz.*, *material for repair*, this will be considered when we come to Q.-M. stores.

4. GUNS, CARRIAGES, AND ORDNANCE STORES.—In the Equipment tables, p. 31, will be seen a detail of articles which make up a gun carriage, ammunition wagon, &c., complete; this is a thing not generally understood. I will give an example:—supposing only one gun carriage is being handed over, in the voucher we see 6 *linch pins*, 1 is produced and said to be spare, 4 are shown you on the axletree arms, and one on the arm under the footboard of the limber, total 6; but on referring to p. 31, Equipment tables, we see that a gun carriage complete has 2 *linch pins*, and a limber complete 3, total 5; you are

therefore in reality only taking over 1 lynch pin and *signing the voucher for 6*. Do not forget that the pins and washers on all the spare arms are part of the carriage, and pins should have ties in them. The *straps* are another thing which are liable to be taken on trust, both as regards number and length, but as regards the length do not be hypercritical, if they are long enough for their purpose, accept them, but do not accept any deficiency in number; for detail of straps, see Equipment tables, p. 36, they also are part of a carriage complete.

The usual way to take over the gun stores is for them to be laid out in front of the guns, and the taking over calls out the number of each article on the voucher and then say No. 1, 2, 3, 4, 5, 6, in succession, the limber gunners and No. 1 of each subdivision saying how many of this article they have. I would not take over in this manner again, as it is not satisfactory. I would have every store laid out in an easily countable line, or lines, together. The wheeler, farrier, and collarmaker should of course examine the carriages, they are very likely to be quite unserviceable; indeed, I have known in one station of five batteries, the carriages of three batteries in such a shaky state as to be totally unserviceable, and they had all to be "made over," this was through no fault of the C. O.'s or battery artificers. I should open several common shell, noticing if wads were in, and sample the bursting charge of one or two. I would also open some shrapnel and examine the primer and bursting charge. At least six cartridges per sub-division should be weighed, and one or two should be opened; of course if there was any suspicion I should open more, remembering that in India some soldiers have guns and shoot a good deal; have the bits, hook-borer, removed from the blocks, see that the sponges are not too low, and that the wad-hook worm can be screwed into the head of the rammer, the paper covers of the cartridges should not be in too bad a state; of course all ropes should be uncoiled; the worsted in the pockets of the box lids is very liable to be rotten; there is liable to be a mistake about the nomenclature of the spare axletrees, they should be compared with the drawings in "Aids to Nomenclature of Field Artillery Equipment," which is taken over with the books, and the number of brief notes detailed in Equipment tables, p. 23, will also assist. Examine the cylinders containing tubes and fuzes which, if giving access to the air, I would not take over, as the contents will probably have suffered. In addition to the stores in the gun park, there will be a number of miscellaneous articles which will be taken over and put in the Q.-M. store. I would refuse to take over the entrenching tools (saws, hammers, &c.) now, though they are in the gun park, as they are on separate vouchers and part of camp equipage, and artificer's tools should be taken over at their proper time and place; when the guns are taken over their register sheets should be given over at the same time and compared.

5. ARTIFICER'S TOOLS AND Q.-M. STORES.—It is best to have all the artificer's tools laid out in the same place, and at the same time to have the station store ledger at hand, as many tools are borne on it; it will

save trouble in the end to properly measure the various tools of which dimensions are given, *i.e.*, blades awl, chisels, drifts, files, &c., there are a multitude of different descriptions of hammers—a fruitful source of muddle; of course there is no necessity to count the small needles. We now come to the Q.-M. stores, by which term I mean *material for repair of harness and saddlery*, and *material for repair of carriages*, and the remaining articles borne on the station store ledger; below is a list of the above materials for repair, showing the amount of the annual supply and the amount per month and six months, from which the amount to be handed over can be easily calculated, remembering that material for harness is supplied on the 1st March, and that for carriages on the 1st August; in some cases these may not bear vouchers, but request that vouchers may be passed for them, as future trouble may be prevented thereby. In addition to the above there is a certain amount of material for repair borne on charge on the equipment ledger as “*reserve*” which of course should be on vouchers, the proportion of this reserve is laid down on p. 152, Army Regulations, India, Vol. III., and should be in good condition, as it is ordered to be replaced by new material annually. The taking over should be careful about the nomenclature and measurements of the various odds and ends included in material, as, if not correct, much trouble is caused by having to sort it out afterwards, and you are doing the work which should have been done by the giving over.

Materials for Repairing Harness and Saddlery.

Articles.	Annual Supply.	Per Month.	Six Months.
HARNESS AND SADDLERY.			
<i>Harness, General Service, and Saddlery, Universal.</i>			
Seats, leather, for saddles, with iron arches—			
Harness—			
Luggage No.	3	$\frac{3}{12}$	$1\frac{1}{2}$
Universal „	5	$\frac{5}{12}$	$2\frac{1}{2}$
<i>Harness and Saddlery, parts of.</i>			
Bits bridoon „	9	$\frac{9}{12}$	5
Chains, curb „	11	$\frac{11}{12}$	6
<i>Miscellaneous Articles and Stable Necessaries.</i>			
Couples, trace „	15	$\frac{9}{12}$	5
<i>Material for Repair of</i>			
Bosses, brass, harness and saddlery—			
Bit „	9	$\frac{9}{12}$	5
Breastplate and crupper „	2	$\frac{2}{12}$	1

Materials for Repairing Harness and Saddlery.—Continued.

Articles.	Annual Supply.	Per Month.	Six Months.
Buckles—			
Brass roller, single, 1" No.	2	$\frac{2}{12}$	1
Buckles, iron, roller—			
Barred—			
1½-inch, bridge, surcingle and stirrup leather ..	20	$1\frac{2}{3}$	10
1-inch	11	$\frac{11}{12}$	6
$\frac{7}{8}$ "	27	$2\frac{3}{12}$	$13\frac{6}{12}$
$\frac{3}{4}$ "	7	$\frac{7}{12}$	$3\frac{1}{2}$
Single—			
2¼-inch, band, belly, G.S.	2	$\frac{2}{12}$	1
2¼ " tug, "	2	$\frac{2}{12}$	1
2 " " "	7	$\frac{7}{12}$	$3\frac{1}{2}$
1½ " " "	22	$1\frac{10}{12}$	11
1½ " " "	13	$1\frac{1}{12}$	7
$\frac{3}{4}$ " running reins	—	—	—
$\frac{5}{8}$ " " "	9	$\frac{9}{12}$	5
Buckles, iron, tinued, roller, inlet, $\frac{3}{4}$ " numnah ..	8	$\frac{8}{12}$	4
Burrs, copper, for bosses, breastplate and crupper lbs.	—	—	—
Chains, trace—			
Lead No.	2	$\frac{2}{12}$	1
Wheel	2	$\frac{2}{12}$	1
Cord, whip, harness lbs.	6	$\frac{6}{12}$	3
Hair, horse, curled (sec. IV.)	32	$2\frac{8}{12}$	16
Hooks, curb No.	11	$\frac{11}{12}$	6
" trace, sliding	4	$\frac{4}{12}$	2
Numnah—			
Cuttings lbs.	—	—	—
Felt yds.	3	$\frac{3}{12}$	$1\frac{1}{2}$
Rings, iron—			
1½-inch No.	8	$\frac{8}{12}$	$4\frac{1}{3}$
1 "	7	$\frac{7}{12}$	$3\frac{1}{2}$
Serge, collar-makers, 15 ozs. per yard, 40 inches wide yds.	24	2	12
Squares, head-collar, iron No.	11	$\frac{11}{12}$	$5\frac{1}{2}$
Studs, brass—			
Wallet or head collar	27	$2\frac{3}{12}$	14
Thread—			
Black, 3-cord lbs.	—	—	—
Collar	3	$\frac{3}{12}$	$1\frac{1}{2}$
Flax, sewing—			
Coarse	5 12	$7\frac{1}{2}$ oz.	2 14 lb. oz.
Fine	5 0	$6\frac{1}{2}$	2 8

Materials for Repairing Harness and Saddlery.—Continued.

Articles.						Annual Supply.	Per Month.	Six Months.
Thread, whited, brown	...	...	...	lbs.		1 4	$1\frac{1}{2}$	0 10
Twine, quilting	...	...	...	..		3 8	$4\frac{1}{2}$	1 12
Web—								
Straining, 3-inch	...	...	...	yds.		2	$\frac{1}{2}$	1
<i>Saddletrees and parts of Saddletrees, Fittings for.</i>								
Cases, cloak, for harness, drivers saddles	No.					3	$\frac{3}{12}$	$1\frac{1}{2}$
Flaps, saddle, iron or wood-arches—								
Harness—								
Drivers	...	...	...	..		1	—	1
Luggage	...	...	...	..		1	—	1
Universal	...	...	...	..		1	—	$\frac{6}{12}$
<i>Ironwork for Iron Saddletrees.</i>								
Arches, N.P.	{ drivers,	{ front	...	..		5	$\frac{5}{12}$	3
		{ hind	...	..		5	$\frac{5}{12}$	3
	{ luggage,	{ front	...	..		1	—	—
		{ hind	...	..		1	—	—
	{ universal	{ front	...	..		1	—	—
		{ hind	...	..		1	—	—
Dees, drivers, luggage and universal	...			..		27	$2\frac{3}{12}$	$13\frac{1}{2}$
Plates,	{ for dees, luggage	...	...	..		4	$\frac{4}{12}$	2
		{ drivers	...	..		19	$1\frac{7}{12}$	$8\frac{1}{2}$
	{ with dees, { luggage	...	...	..		4	$\frac{4}{12}$	2
Rivets, 2-inch, drivers, luggage and universal	...			..		27	$2\frac{3}{12}$	14
Staples, flank, drivers and luggage	...			..		15	$1\frac{3}{12}$	8
Staples, girths, drivers, luggage and universal	...			..		17	$1\frac{5}{12}$	9
Troughs, luggage...	...			..		1	—	1
Cloaks, universal, or holster	...			..		1	$\frac{1}{12}$	$\frac{6}{12}$
<i>Woodwork for Saddletrees.</i>								
Bar, side, in the rough—								
Harness—								
Drivers—								
Near	...	...	...	..		5	—	3
Off	...	...	...	..		5	—	3
Luggage—								
Near	...	...	...	..		1	—	—
Off	...	...	...	..		1	—	—
Universal—								
Near	...	...	...	..		1	—	—
Off	...	...	...	..		1	—	—

Materials for Repairing Harness and Saddlery.—Continued.

Articles.	Annual Supply.	Per Month.	Six Months.
<i>Miscellaneous Stores (Section IV.)</i>			
Borax lbs.	—	—	—
Dubbing "	263	21 $\frac{1}{2}$	132
Leather, pieces, buff "	10	1 $\frac{1}{2}$	5
Hides—			
Buffalo, tanned and curried—			
Heavy lbs.	221	18 $\frac{7}{6}$	110 $\frac{1}{2}$
Light "	104	8 $\frac{1}{6}$	52
Cow, tanned and curried			
Ordinary "	46	3 $\frac{1}{2}$	23
For lining collars "	44	3 $\frac{1}{6}$	22
White "	6	1 $\frac{1}{2}$	3
Ink, marking, country pints.	1 $\frac{1}{2}$	—	$\frac{3}{4}$
Iron, wrought—			
Nails, iron, tacks, Flemish, black, No. 129			
$\frac{1}{2}$ -inch lbs.	3 4	4 $\frac{1}{2}$	14 $\frac{1}{2}$
Oil—			
Linseed, raw pints.	$\frac{1}{2}$	—	$\frac{2}{3}$
Cocanut gal.	20	1 $\frac{8}{12}$	10
Sweet or tillee "	—	—	—
Rangoon pints.	1 $\frac{1}{2}$	—	$\frac{2}{3}$
Pans, tin, for oil or dubbing No.	4	—	2
" earthen, 6 quart "	1	—	1
Paper, glass sheet.	$\frac{2}{3}$	—	—
Sheeting yards.	3 12	0 5	1 14
Screws, iron, flat-head, Nettlefold's, middling—			
1" Book No, 225, gauge 12 gross.	0 1 2	1 $\frac{1}{2}$	7
$\frac{3}{8}$ " " " 522, " 9 "	0 9 2	9	55
Skins, sheep, tanned and curried... .. No.	46 $\frac{1}{2}$	3 $\frac{1}{2}$	23 $\frac{1}{2}$
Soap, { soft lbs.	87	7 $\frac{3}{12}$	43 $\frac{1}{2}$
{ yellow, best "	112	9 $\frac{2}{12}$	56
Wax—			
Bees "	1 2	1 $\frac{6}{12}$	9 oz.
Black "	5 8	7 $\frac{4}{12}$	2 12
Oakum, tarred "	6	$\frac{6}{12}$	3
Canvas, sail yards.	11	1 $\frac{1}{2}$	6

Materials for Repairing Carriages, 9-pr. R.M.L.

Articles.	Annual Supply.	Per Month.	Six Months.
ORDNANCE.			
Boards in the rough, platform—			
Lumber No.	1	—	—
Wagon, { centre "	1	—	—
{ front and rear "	1	—	—
Bevelled—			
$\frac{3}{8}$ " \times $4\frac{1}{2}$ -inch long "	4	$\frac{1}{3}$	2
V. $\frac{1}{2}$ " \times $1\frac{7}{8}$ " "	6	$\frac{1}{2}$	3
Hexagon head—			
$\frac{5}{8}$ " \times 2-inch long "	3	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{1}{2}$ " \times $2\frac{1}{8}$ " (2 nuts) "	12	1	6
Nave, wheel, 2nd class "	12	1	6
Tire, wheel, with collar, 2nd class "	12	1	6
Capsquares, W. I., for carriages, W.I., field, R.M.L., 9-pr.—			
Left "	1	—	—
Right "	1	—	—
Eyes, W.I.—			
Perch, wagon, ammunition, R.M.L., 9-pr., and upwards, also wagon forge, Mark II. and store "	1	—	—
Trail, 3rd class carriages, W.I. field, R.M.L., without ring and shoe, 9-pr. Mark I. "	1	—	—
Felloes, wheel in the rough, 2nd class, for 3 or $2\frac{1}{2}$ -inch tires, 5 feet "	6	$\frac{1}{2}$	3
Hooks, iron, limber, complete, R.M.L. iron, field, 9-pr., Mark I. "	1	—	—
Iron, wrought, pieces, for repairs—			
2 feet 8 inches long—			
angle—			
$2'' \times 2'' \times \frac{3}{8}''$ "	2	$\frac{1}{6}$	1
bolt or round—			
$\frac{7}{8}''$ "	2	$\frac{1}{6}$	1
$\frac{3}{4}''$ "	2	$\frac{1}{6}$	1
$\frac{3}{8}''$ "	2	$\frac{1}{6}$	1
$\frac{3}{8}''$ "	4	$\frac{1}{3}$	2
flat—			
$2'' \times \frac{1}{4}''$ "	4	$\frac{1}{3}$	2
$1\frac{1}{2}'' \times \frac{1}{2}''$ "	2	$\frac{1}{6}$	1
$1\frac{1}{2}'' \times \frac{3}{8}''$ "	2	$\frac{1}{6}$	1
plate, 1 foot 2-inch long—			
$\frac{5}{16}'' \times 6''$ wide "	1	—	—

Materials for Repairing Carriages, 9-pr. R.M.L.—Continued.

Articles.				Annual Supply.	Per Month.	Six Months.
Keys, wrought-iron—						
capsquare, with chains, carriages,						
W.I., travelling field, 9-pr. R.M.L.						
Mark I. ... ..	..	6	$\frac{1}{2}$	3		
locking, turnbuckle, with pocket ... ..	..	14	$1\frac{1}{6}$	7		
split, hand-wheel, R.M.L. 9-pr. ... ..	..	6	$\frac{1}{2}$	3		
Keys, steel, limber-hook, with chains,						
R.M.L. field, 9-pr. ... ..	..	2	$\frac{1}{6}$	1		
Levers, W.I., traversing, with pawl, 9-pr.,						
R.M.L. ... ..	..	1	—	—		
Loops, W.I., sponge, R.M.L., 9-pr.						
..	..	—	—	—		
Naves, wheel, metal, without bolts, field				1	—	—
Pins, wrought-iron, keep, elevating, eye-						
bolt, R.M.L., 9-pr. ... ..	..	12	1	6		
Plates, wrought-iron, staple—						
single box ... ..	..	8	$\frac{2}{3}$	4		
treble ... ..	..	2	$\frac{1}{6}$	1		
Rivets, steel, conical, $\frac{3}{8}$ " \times 3"				30	$2\frac{1}{2}$	15
" copper, $\frac{5}{16}$ " \times $1\frac{1}{2}$" ... ..	..	24	2	12		
" wrought-iron ... ..	..	—	—	—	
Boss-head—						
$\frac{1}{2}$ " \times $1\frac{1}{2}$" ... ..	..	10	$\frac{5}{8}$	5		
$\frac{7}{16}$ " \times $1\frac{1}{2}$" ... ..	..	50	$4\frac{1}{6}$	25		
$\frac{1}{4}$ " \times $1\frac{1}{2}$" ... ..	..	6	$\frac{1}{2}$	3		
Spokes, wheel, in the rough, 2nd class,						
5-feet ... ..	..	12	1	6		
Staples, wrought-iron—						
lashing, riveting ... ..	..	12	1	6		
Steels, moveable—						
eye, trail or perch ... ..	..	6	$\frac{1}{2}$	3		
limber-hook ... ..	..	6	$\frac{1}{2}$	3		
Nails,	Iron,	copper wrought, tacks, No. 471,				
		length, $\frac{1}{2}$ "	lbs.	0 4	0 0 $\frac{1}{3}$	0 2
		brads, wrought, No. 26, length $1\frac{1}{4}$" ..	..	0 8	0 0 $\frac{2}{3}$	0 4
		clasp, { fine, No. 71, .. $1\frac{1}{2}$" ..	..	2 0	0 2 $\frac{2}{3}$	1 0
		wrought, { .., " 72, .. 2" ..	..	3 0	0 4	1 8
		strong, No. 80, length, $2\frac{1}{4}$" ... ..	..	3 0	0 4	1 8
		clout, wrought, { No. 103, length $1\frac{1}{8}$" ..	..	0 4	0 0 $\frac{1}{3}$	0 2
		counter S., { .., " 104, .. $1\frac{1}{2}$" ..	..	1 8	0 2	0 12
		Hd. strong, { .., " 108, .. $2\frac{1}{2}$" ..	..	0 4	0 0 $\frac{1}{3}$	0 2
		tacks, clout, No 20, length $\frac{3}{4}$" ... ..	..	0 8	0 0 $\frac{2}{3}$	0 4

Materials for Repairing Carriages, 9-pr. R.M.L.—Continued.

Articles.				Annual Supply.	Per Month.	Six Months.
Oil, coconut gals.				0 0 $\frac{1}{2}$	0 0 $\frac{1}{2}$	0 3
Screws, { brass, flat-head, Nettlefold's { strong, 1 $\frac{1}{2}$ " gauge, 20 ... No.				12	1	6
Screws, iron, flat-head, Nettlefold's	<i>Middling.</i>					
	2" book, No. 529, gauge 14			14	1 $\frac{1}{2}$	7
	1 $\frac{3}{4}$ " " " 528, " 14 ... "			6	1 $\frac{1}{2}$	1
	1 $\frac{1}{2}$ " " " 526, " 13 ... "			20	1 $\frac{1}{2}$	10
	1" " " 525, " 12 ... "			18	1 $\frac{1}{2}$	9
	$\frac{3}{4}$ " " " 523, " 10 ... "			78	6 $\frac{1}{2}$	39
	$\frac{5}{8}$ " " " 522, " 9 ... "			118	9 $\frac{1}{2}$	59
	<i>Strong.</i>					
	3 $\frac{3}{4}$ " book, No. 550, gauge 28			6	1 $\frac{1}{2}$	1
	3" " " 549, " 24 ... "			12	1 $\frac{1}{2}$	6
	2" " " 546, " 22 ... "			6	1 $\frac{1}{2}$	1
	1 $\frac{1}{2}$ " " " 545, " 20 ... "			18	1 $\frac{1}{2}$	9
	1" " " 543, " 16 ... "			72	6	36
	$\frac{3}{4}$ " " " 541, " 13 ... "			144	12	72
Screws, iron, round-head, Nettlefold's middling, 1 $\frac{1}{2}$ " gauge 13				24	2	12
Screws, { W.I., elevating, (without nut) { for carriages, travelling, { field, W.I., R.M.L., 9-pr... ..				1	—	—
Staples, iron, round, crowned, small				6	$\frac{1}{2}$	1

6. BARRACK AND BARRACK STORES.—This is a simple operation, as a representative of the Barrack Department is always present, who will have a list of the number of each article in each room, *which the taking over should note at the time*, as otherwise his only information will be the number of articles altogether, *e.g.*, if there are a hundred kit boxes, the taking over should note at the time how many there are in each room. As an example of how small barrack damages are, a battery I know, which lately changed stations, had only 14 annas to pay for damages.

7. TENT AND TENT EQUIPAGE.—This is also a simple matter, as a Committee of Survey should be applied for to the Station authorities, the taking over or his representative being one of the members, the Committee will note the damages, and give their opinion who is responsible.

8. INSTITUTIONS.—By this I mean *Canteen, Government Library, Schools, &c.*

The *Canteen* gives no trouble, as the value of the property is valued by a Board, on which is, if possible, a representative of the taking and giving over; if this cannot be arranged the Board is composed of independent members.

The *Government Library* should not be handed over direct, but should in the first place be handed over by the giving over to the local Staff Officer, who in turn gives it over to the taking over; the proceedings of the last Board should be examined, and the accounts, to see if the repairs ordered by the last Board have been carried out, and, if not, that sufficient money is given over to execute them; also see "Army Regulations, India," Vol. II., Part II., para, 1851, in which will be found the number of books which should be in the Library, and do not take over unless the establishment is complete, or there are funds to complete it.

Before taking over the schools, read "A. R. I.," Vol. XIII., (British Army Schools) paras. 163, 164, by which it will be seen that they should not be taken over direct.

9. DOCUMENTS.—The documents handed over will all be enumerated on the printed form—Receipt for Documents, Army Form, B. 279; documents of natives, however, may escape notice. Each native driver should have Transfer Clothing Return, Return of Cloaks and Capes, and a List of Necessaries in possession, also Defaulter sheet, Medical History Sheet, and Attestation. The documents should be examined to see if they have been properly signed, and the Savings Bank statement compared with the men's account books; do not forget the last pay certificates for all ranks and followers.

10. BOOKS.—These again should not be taken over direct, but in accordance with R. O. I., September, 1883, No. 80. A Regimental Board should assemble. The list of books in the possession of a battery are enumerated in "R. A. in India," No. 42 of '85. The points to be looked to are that the books are corrected up to date, and that the slips issued for that purpose are pasted in, *do not take for granted that bound up orders are complete*, examine every page, and, above all things, do not accept as a fact a single word you may be told by the N.-C.-O.'s and clerks in the office, giving over, about their completeness (*experto crede*). I lay great stress on the subject of back orders being complete, as it is impossible to carry on the work of a battery unless they are complete, and back orders are like the sea sand for multitude.

11. FUNDS AND MONEY BELONGING TO THEM.—The funds to be taken over will be those pertaining to the native establishment, *i.e.*, *hutting fund* and *grass fund*. The *hutting fund* is a fund to keep the natives huts in repairs, and they pay a small monthly rent—enquire at the time how much rent each native pays; also if the three rupees which is allowed the lascars and native drivers every time they change stations is paid into the fund or not, as in some batteries this is done, and the lascars do not pay rent.

The *Grass Fund* is a fund made up by gram grinding money; fines of natives, sale of litter, &c., and is to be expended for the benefit of the horses and giving occasional help to a syce under some exceptional circumstances. Account books of each of these funds should be handed over, and not a few months' accounts copied out; the balance should not be unduly small. The property handed over with the Grass Fund, *i.e.*, line carts, gram grinding machine, chaff-cutter, &c., should be entered in the fund account book.

I append a list of orders not already mentioned which apply to taking over a battery; unfortunately I have lost my original and nearly complete list; however I hope at a future time to give a complete list as a supplement, as it is a compilation of many scattered orders.

Orders relating to taking over a battery, Army Regs., India, Vol. III., Equipment, paras. 11, 15, to 23 inclusive, 126 (though this applies to a battery C. O. giving over, yet enquire if this list referred to has been sent in, or else you will be let in for doing so yourself) 133, 134.

Army Regulations, India, p. 811, Part II., Descriptive paras. 1803, 1892 to 1898, 1863, &c.

JUDGING DISTANCES BY SOUND.

BY

MAJOR F. T. M. BEAVER, R.A.

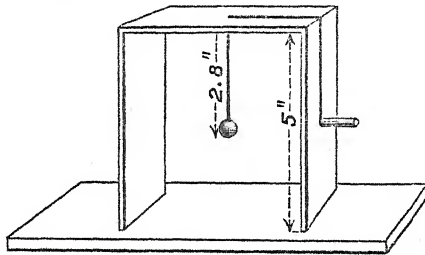
THE following is the description of a pendulum for judging distances by sound :—

Each beat marks the time taken for sound to travel 100 yards, and consequently represents one hundred yards of range.

The pendulum, which consists of a piece of fine string with a ball of lead at the end, should be 2·8 inches long, the length being measured from the point of suspension to the centre of gravity of the lead.

When put in motion it should beat 11 times in 3 seconds, or 33 times in 9 seconds, or 110 times in half-a-minute.

The best way to construct the instrument is to make a wooden frame about 5 inches square resting on a wooden stand.



The string is then passed through a hole drilled in the centre of the top bar, and after having been passed along the top and down the side, is wound round a peg half-way down the side.

The pendulum can be graduated to the proper length by unwinding or winding up the string, and be tested by being set in motion, and the number of beats counted for a given time.

To observe the burst of a shrapnel shell, the instrument should be held in the left hand between the eye and the target, the ball of the pendulum being held in the right hand and released so as to set it in motion when the gun is fired. The number of beats should be counted between the shell being seen to burst and the report being heard. This will give the distance in hundreds of yards which the shell burst from the muzzle.

For example, suppose that shrapnel was being fired at an object 1700 yards distant, and that the report of the bursting of the shell was heard after 15 beats of the pendulum from the time the burst was seen, it would be known that the shell burst at 1500 yards from the muzzle, or 200 yards short of the object aimed at—the fuze could be corrected accordingly.

In like manner the range of any opposing battery can be taken by

counting the number of beats of the pendulum between the flash of a gun and hearing its report.

The instrument has been used successfully both in India (at Sialkot) and at Hay Camp this year. It is a good rough guide for correcting shrapnel fire; it costs nothing to make, and is easy to understand. The pendulum should be tested with a watch periodically, as the string is likely to lengthen by constant tension.

The following is the calculation for finding the length of the pendulum:—

Calculation for length of pendulum for range-taking by sound.

The length of a pendulum in inches to oscillate in seconds is—

39·0265 at the equator,

39·1393 in latitude of London,

$39·0265 + ·1608 \sin^2 \lambda$ for any latitude λ .

The velocity of sound at a temperature of—

60° F. is 373 yds. per second.

70° F. is 377 „ „

80° F. is 381 „ „

Sound will therefore travel 100 yards in the following times at the following temperatures—

At 60° in $\frac{1}{3·73}$ of a second = t_1

„ 70° in $\frac{1}{3·77}$ „ „ = t_2

„ 80° in $\frac{1}{3·81}$ „ „ = t_3

The length of a pendulum oscillating in the above times $t_1 t_2 t_3$ is obtained from the formula

$$t = \pi \sqrt{\frac{l}{g}}$$

where $l_1 l_2 l_3$ are the lengths of the pendulums corresponding to the times $t_1 t_2 t_3$

Substituting in this formula we obtain the length of the pendulum—

l_1 at 60° F. = 2·81 inches,

l_2 at 70° F. = 2·75 „

l_3 at 80° F. = 2·69 „

Each beat of a pendulum of the above lengths would represent 100 yards of range at the above temperatures.

The pendulum should make the following number of beats per minute:—

At 60° 223·8,

„ 70° 226·2,

„ 80° 228·6.

LESSONS IN STRATEGY OF MODERN WARS.

(From Prince Kraft's "Letters.")

A REVIEW.

BY

LIEUT. ST. J. L. H. DU PLAT TAYLOR.

THE following pages are merely a digest of parts of Prince Kraft's copious and interesting "Letters on Strategy," which, though too bulky for translation, are well worth reading for anyone interested in strategy.

In his first letter, he deals with strategy as a whole, and explains his method of working out the subject from the various campaigns; the following pages will only follow him through the 1870 campaign.

A strategist has throughout his operations a harder task than a tactician, having to carry all his movements out, with only the assistance of maps, his own brains, and the information that he can obtain from his reconnaissances, &c.; he has the lives of large masses of men in his power, which he may have at times to use without hesitation, though without reckless waste; further, he has the reputation and safety of a nation in his hands alone. The tactician, on the contrary, has only to *carry out* what he is ordered, on the actual ground; is not responsible "whether" or "not" a battle is to be fought, and consequent great loss of life to be incurred; is generally only one of the many units responsible to his country. Further, a tactician has the advantage of sharing any dangers with his men, and any great faults can but be expiated by his own life if necessary; whereas a strategist should only leave his post, far away in rear, when it is a case of raising the spirit of broken or disheartened troops, for the sight of a defeat, or even the great loss of life is apt to unnerve, and thus upset all the plans of, any but the very best of strategians.

The strategist must at all cost, keep firmly to his original resolutions in spite of varying events, contradictory information, unexpected defeats, &c., *vacillation being fatal*.

Strategy is not a "science" but an "art," requiring an accurate knowledge of *several* sciences, and *chiefly* the *special characteristics* for it. Thus a man who has not had vast experience of war must study largely, and even then, the "iron nerve," "unflinching resolve," and some personal experience, are necessary to make the strategist.

As regards the *study*, the most careful study of one single campaign, is useless; for, says the Prince, "before we can take a lesson from

any event in war, we *must* find a repetition of it in history," and the more often this is so the sounder we may consider the lesson. Even then, one must not take any such as an *infallible* rule, but only as a groundwork for future resolutions and actions.

In thus studying a campaign we should look for the *reasons* for every movement, &c., not whether it was good or bad. Thus we should avoid all campaigns which are not absolutely clearly known in history, especially as regards the reasons which influenced strategy. Thus the Russo-Turkish war, 1877, and all wars before this century, will teach us nothing, for "*La critique est aisée, l'art difficile.*"

In noticing faults and mistakes we should therefore look for the *motive* which led to them, not *who* made them. Furthermore, we should confine our study mostly to the development of a campaign; for after the first decisive engagement, the events follow in quick succession, and are more or less guided by chance.

Keeping, then, a rough idea of all the phases of a war, pursuits, retreats, organization, and supply, &c., &c., we may have some idea of strategy, which is defined by Clausewitz as "The use of battles for the furtherance of war"; tactics being—"the employment of troops for the furtherance of battle." The Prince defines it in its distinction from politics, which he says, "Are the use of war for the furtherance of state purposes." He further reminds one that these three—tactics, strategy and politics—must work in harmony for any good to result from any one of them. We may notice that they are so intimately connected that, though as a rule, strategy depends on politics, and tactics on strategy; it often occurs that the reverse may be the case, strategy having to be varied owing to tactical considerations, and politics sometimes having to bow to strategy; for instance, when an ally is wanted for strategical purposes, he must be obtained by politics; again, diplomacy may often require to be assisted by tactical operations or threats; and still we may often see diplomacy greatly altered owing to a tactical failure or success.

In 1864, the Germans were tactically forced to take Kolding, a neutral fortress, leaving it to politicians to appease the offended nation, and an exactly similar case is presented by the Pendjeh incident. Seeing then the close intimacy of the three, it is obvious that they should all be under one supreme management, if consistency is to be expected. A strategist must embrace in his studies *every* single *branch* of army work, from temporarily governing a country, to managing a railway, from promulgating orders, to making a reconnaissance; this knowledge, of course, does not require detailed study of the various branches, such as building a fortress or driving an engine.

It would be absurd to expect to have a regular system laid down for all strategic operations, thus—"The "internal lines" of Frederick the Great's time was only the result of his position." And in 1870 and 1871, we see both "internal" and "external lines" exemplified.

He gives, however, the following axioms for all strategy, which one cannot do better than quote:—

"1. Politics and strategy must go rigidly hand in hand.

2. The overcoming of the enemy's forces must be the sole aim, occupation of towns, &c., being merely secondary considerations.

3. Never can one be too strong for the decisive engagement. All exertions being directed to bringing *all* available forces for it, and then only using what are found absolutely necessary.

4. One must not bind oneself to any one system, but allow sound reasoning to have full play, and choose the simplest way for the desired result.

5. Changes in plans once made (except under stress of events and enemy's movements) lead to dilatoriness and fatal results to the campaign."

We may further assume that a strategist should never be surprised at an unexpected turn in events, but should weigh everything previous to moving, and should not be afraid to risk anything, providing it is done at the right time.

The Prince finally puts it that a good strategist should "lay down the law for his enemy."

THE 1870 CAMPAIGN.

Having now briefly considered strategy in its various lights, as a science, we may study the 1870 campaign as the most instructive, because it was carried out with nearly the same appliances as are available for modern war. Weapons were sufficiently precise to have an appreciable effect on tactics, and the improvements in those important elements of strategy—transport and communication—by railways and electric telegraph, allow of useful deductions being made by the student.

This campaign will remain an example of modern strategy as long as these conditions exist, but it must not be taken as an universal pattern of strategy; for climate, nature of country, facility of communication, &c., must always affect the principles of a campaign. Strategy may appear at first sight so simple, that one may wonder how a Commander could make a mistake, but simple as it seems it is very hard to carry into practice, when the smallest event or fault may cause considerable alteration to the plans.

Before studying the campaign itself, it would be well to master the political situation of the two countries between 1866 and 1870; though it will suffice here to point out that after three years, 1867, 1868 and 1869, of an "armed peace" as it were—no one knowing at what moment war might break out—people were becoming accustomed to the situation, when the speech of Grammont's quickly followed on 19th July, by the declaration of war, startled the nation into activity. Thus, we see the Germans losing the political initiative, and, from the universal opinion of the French Emperor's capabilities, compelled to assume the defensive.

We must now consider how the German authorities met this disadvantageous commencement, which however by the slowness and

incapacity of French organisation, was not of such advantage as it should have been to them. The Prince describes the hourly increasing excitement throughout the country, which however was not caught by the authorities, who thus went coolly and quietly to work, and the single message "Mobilize systematically from the 16th July," was followed by the memorable mobilization.

The small States spontaneously combining, Germany became a united power against France. No plans of operations were made beyond getting the threatened frontier in a state of defence; indeed, having lost the "offensive" start, it could not be settled where the troops should be utilized for the offensive, until the French should show their hand, and a vigorous defensive *only* is fatal to a campaign. We thus see the plans only arranged as regards the place for the "strategical massing," the choice of which we will now consider.

Belgium, Luxemburg and Switzerland being neutral, the Germans had choice of two parts of their frontier to advance from, the northern from Perl to Lauterburg, the southern from Lauterburg to Basle.

The latter was chosen for *passive* defence, owing to the strong defensive barrier formed by the Rhine, which however would have impeded any offensive advance, and not being so well provided with communications, railways, &c., as the northern, which afforded excellent means for massing a large number of troops. We may notice *en passant* the speed with which the mobilization was carried out, and how exactly its completion was timed and effected by the 20th day after the order was issued.

Acting on the maxim that every "strategic massing" should aim at the simplest and easiest apparent plan, the French should in the same time have been assembled to oppose them between Metz and Strasburg. The official memoir goes thoroughly into all the cases it considers likely to arise, and *yet* the unexpected arose, showing the impossibility of arranging plans beforehand. In this case the French army was still unfit for the field when the German had completed its "strategic massing."

As regarded the possibility of a French landing, and thus a possible insurrection in the North, the best means to prevent the latter was to push as soon as possible into the enemy's country. As regards the "strategic massing" as he calls it, or assembly of troops before a campaign, it should be undertaken with all available troops, which should be massed at one place and not split up, so that the Commander should have at hand all troops necessary to push forward to the "decisive spot." This is well exemplified in German plans when all the forces were massed on the northern frontier, the southern being almost denuded of troops. It is laid down that "plans once formed, as the right ones, should be rigidly kept to," even, as in this case, where there may be great risk attached to, and demanded of other troops in a different part of the frontier. Turning now to plans of operations *after* the "massing" it is to be remembered that nothing can be laid down beforehand, the first engagement (as on the 6th of August), gives the clue to the most advisable movements. It is worth

following how the events of 6th and following days disclosed as it were the possible plans of campaign. He says "the 'strategic mass' behind the Perl-Lauterburg line faced nearly south, having, it was supposed, the French 'mass' in front of it," and a direct advance would have pushed the French south instead of north. "McMahon being driven on 6th down to Chalons, and part of chief army being defeated at Spicheren, the country south of Metz was open to a German flank movement, whilst a similar one on the north might have hemmed them in between the fortress and the Luxemburg frontier," but the development of events was still awaited before forming definite plans.

Again, no geographical point should be aimed at, the enemy's chief forces being the objective; and if the most probable situation is chosen, a faulty one on the enemy's part puts him at a disadvantage.

A careful study is made of the railway arrangements, and would bear perusal, but here it will suffice to point out that all danger of the destruction of the force in detail as they arrived was avoided by detraining and massing them some distance in rear of their positions, and then moving them up, thus accustoming the troops to marching, as well as freeing the line to the front. The troops already at the front being ordered to avoid any decisive engagement. We may notice also, how the continued inactivity of the enemy allowed of alterations in the original plans, troops being sent by rail further and further to the front, and in some cases even to different positions to those originally ordered.

The advantage of political initiative is that it gives also the advantage of tactical initiative, and disturbs the plans of the enemy; in this case it caused a loss of five days to the Germans, and it was only the absolute inactivity of the French which nullified that advantage. The strategic importance of cavalry is here to be noticed, as hiding the German operations whilst discovering those of the French.

The sub-division of a force in one theatre of operations is necessary, when it is so large that delay is caused in carrying out the operations ordered by the Commander-in-Chief, who has to think over, and work out on paper his future operations, and then distribute fifteen or more plans, each differing in some details. This sub-division does not depend on numerical strength, but on the number of subordinate commands (corps and detached divisional) in the force. This will be self-evident, for in all armies probably the same sub-dividing occurs, in England even, each "Chief" has six or seven subordinates to convey the orders to. This splitting up into Corps, has the effect of greatly lightening the work of the Commander-in-Chief of a force, by taking from him all details of "supply," leaving him free to study the strategy *only*.

A siege, as at Metz, allows of greater centralization in the command, as the troops are practically stationary, and communication is rapid and easy. We have only to study the details of the German dispositions in 1870 to see how much they were simplified and shortened by the numerical reduction of subordinate commands, and leaving the details to be elaborated by them.

Turning now for a moment to the question of supply, we see an enormous mass of troops assembled in a very small space of country, which not being at any time very fruitful, was completely denuded of provisions. This was counteracted as follows:—the troops all left their head-quarters with five days iron ration, leaving them on arrival at the rendezvous *at least* three days provisions, which started them on their advance with sufficient in hand for two days. The railways being *exclusively* used *at first* for troops were then *completely* free to bring in provisions to the hungry inhabitants. The “strategic massing” is only the opening move of a campaign, and though, as a rule, all decisive engagements should be avoided until it is completed, the opportunity of a success should not be lost, as Weissenburg, Worth and Spicheren. In the latter case the moral effect was of more importance than the material, and the importance of this has been previously pointed out. The “strategic massing” should, as a rule, be followed immediately by the offensive movement, that is, if the enemy’s movements give sufficient clue to the best to be chosen, as in 1870.

One may here notice the importance to the Germans, of the French not following up the advantage of political initiative, thus enabling the former to advance in *full strength*, and this, owing entirely to the short delay caused by French initiative.

The strategical massing of troops on the theatre of war should be the chief and primary aim of the strategist, as all further operations depend on it alone. It may be said to be doubly effective, as—

- (a). An *offensive* assembly of troops on the theatre of operations.
- (b). A *defensive* assembly at the base.

The intimate connection of these two objects is seen by the ease with which the defensive can be suddenly converted into the offensive, as we may notice in the case of the intended and actual *rôle* of the German army; defensive action being forced on them by the political initiative of the French, and the offensive being opened to them by the French dilatoriness. The Prince now defines the “base” as the “country from which the army draws its supplies, provisions, &c.,” thus in 1870, it was not the line of advance but the whole frontier; again in 1882, we had England itself as our base, Ismailia being only what he defines as an “auxiliary” base. The point for the strategic massing should thus be invariably between the “base” or “auxiliary” base and the enemy, and for *offensive* purposes should be as *near* the enemy as possible, thus forestalling him in the attack; but for the defensive it should be as far from him as possible to give time for completion of one’s own massing and organisation; and we may notice here how the Germans fulfilled both these conditions, first massing behind the Rhine and then gradually pushing the position more to the front, as appeared necessary.

The faultiness of not massing the troops may now be self-evident, yet it has occurred in 1806, Prussia, 1869, Austria, and 1870, France.

The “strategic massing” should be carried out with as much concentration as possible, as long as all the troops are so placed as to be

available for a great action in 24 hours. With this object in view not more than two Army Corps should be on the same road, and the formation should rather be a line of columns of two Army Corps strength, the number of these columns depending upon the number of roads available, and the facilities of supply, &c., for its troops. Too wide a front is especially to be avoided.

The points for consideration in selecting the "massing point" are—

- (a). Greatest facility for defending the centre of the "base."
- (b). Easiest point for speedy concentration (this latter might cause a modification of plans as regards (a), especially in these days of railways).
- (c). Natural obstacles to an enemy's attack, assisted by the possibility of defence of that part by a flank movement, would point to its unsuitableness for strategic massing.
- (d). A re-entering angle of enemy's country generally a good point for offensive massing.

We may note how these points were attended to in 1870 by the Germans.

Next in importance to the "strategic massing" comes the destruction of the enemy's force; and here, his movements being unknown, geographical points have to be considered, the most likely positions to be aimed at until information of his whereabouts be obtained, but these should *not* be kept to as infallible, and if he has chosen worse, the greater the advantage to the opponent.

The geographical importance, for offensive and defensive operations, of the points available to the French being so different, and their uncertainty, was the cause of their occupying both defensive and offensive positions; these half measures resulting in their destruction.

Next, turning to mobilization, it is most important that troops should be thoroughly equipped before the march on the "massing" point (compare French and German) the railways and roads being at first required and utilized only for mobilization. The capabilities of the railways have to be considered, and here we may merely notice that in 1870, a double line despatched 18 trains, a single line 12 trains per diem.

The block system should be rigidly enforced between the pre-arranged "halting places," to avoid accidents, and thus delay in concentration. All details of railways should of course have been previously worked out by the Head-Quarter's Staff. The enemy's capabilities in this respect having been also worked out and considered.

"You may perhaps laugh," says he, "when I mention *boots* as a strategic element," but the importance and loss caused at first by sore feet (500 men in Guard Corps on 15th August) is enormous. The above number would have been very much greater, but for one or two days rest and a short peace march, which the troops had been given after disembarkation. Indeed, troops (Infantry) should always be given some marching practice, and, if possible, a day's rest before

offensive movement, as these marches serve also to pull the men together and confirm the discipline.

The military importance of railways is worth careful study; their value is less, the smaller the distance to be traversed, for men are useless for fighting whilst in the train, they lose in efficiency, cohesion and marching practice. Again, if small in numbers, it might be worth while sending them a four days' march by rail, but a large number might be as long doing the distance that way as by march route.

All the above points require long, careful and thoughtful working out, and a country which left such preparations till the last, can but expect a horrible *fiasco* in any future war, now that mobilization is only a matter of weeks. Further than these there is the calculation of the respective strengths of opponents, both in numbers and fighting power, even his power of mobilization and rapidity of concentration, should be known. The Prince then proceeds to explain various other points of detail, but it may suffice to point out how the German manner of issuing orders from the chief command resulted in united action without fettering the Commanders, whereas the French telegraphic and intricate orders to individuals caused hopeless confusion at the seat of action.

In his next letter the Prince deals more with the particular strategy of the campaign, than with its general principles; and under the heading of the "strategic wheel to the right of the Germans from the 7th to the 12th of August," there is a good deal that may be passed over, as only exemplifying particular points of strategy. We may, however, notice that the battles of 6th August were *not* decisive battles, *i.e.*, they were *only* decisive for the French troops actually engaged, and thus did not materially affect the result of the campaign.

The strategical reasons for not following the defeated French may be summarized as follows:—

- (a). The troops (German) were not all actually assembled.
- (b). The enemy had not been so completely defeated as to warrant a pursuit, with the risk of coming upon other unbroken forces in their rear.
- (c). The troops were still a good deal mixed, owing to their having been hurried into action as they arrived, without regard to organization.

Thus we see the pursuit replaced by a *strategical* use of Cavalry who quickly followed and regained touch of the retreating armies, allowing time for the completion of the massing and organization of the Germans, and also giving the troops just engaged a two days' rest. The result of the Cavalry reconnaissances was that McMahon's retreat in a north-west direction to join the main army was known to the German strategians.

The Prince here makes a digression to deal with "retreats" both tactically and strategically.

They may be classed under three heads:—

- (1). Spontaneous—with undefeated troops, (as on 7th August).

(2). Compulsory—after a defeat and in good order, like the 2nd Corps after Spichenen.

(3). Compulsory—in the form of “flight,” (like the 1st Corps).

In the latter case both strategian and tactician having lost all control over the forces, their efforts should solely be directed to guiding the stream on to some point of vantage, *i.e.*, a strong defensive position or another unbeaten force, and there to re-assemble the broken forces ; further, as great a distance as possible should be put between the enemy and themselves, efforts being directed to raising the *morale* of beaten troops by encouragement, instead of by abuse as cowards, &c.

If available, a body of unbeaten troops should be left behind to act as a rear guard, which by constantly deploying in favourable places, may cause the enemy great delay in doing the same for the attack ; it should however carefully avoid becoming engaged seriously, and at all cost avoid risking defeat. Its halting points should be so arranged that it should have plenty of time to reform and retreat without being hampered by its own main body of retreating troops.

The 1st case is exemplified by the Guard, 3rd, 4th, and 6th Corps, on the 7th August, and the following desiderata may be noticed :—

(a). All impedimenta should be sent on well in front, and

(b). On as many roads as compatible with direction of the move.

This kind of “eccentric retreat” can only occur when the enemy is absolutely out of reach and the point of ultimate concentration fairly distant, for under other circumstances, the split-up forces are open to attack and defeat in detail.

Turning now to the detailed movements of the Germans, it will be seen how, for the sake of the offensive, the troops were never more than two corps deep, the front of both armies being less than 35 miles. On the French side, McMahon being now (8th August) at Sarrebourg, the retreat on Chalons, previously decided on, was given up, in the hope that, by assembling 200,000 men at Nancy, a defeat of *part* of the German forces would pacify public feeling. The German “chief command” now (10th August) decided on the wheel to the right, which was carried out simply and effectually on the issue of three short telegraphic orders, a separate stretch of country and separate roads being allotted to each army. On the French side, the army of Metz had on 10th August taken up a position on the French Nied, as discovered by the German Cavalry, who were pushed far forward, merely to gain the information required by the head-quarter staff. By the 12th, the German forces had completed the change of front, only to find that the French had again altered their minds and withdrawn from the Nied position.

The French retreat from the Nied position to Metz, made it imperative on the Germans to attack and defeat them, before a further advance west could be safely made ; and to this may be traced the plan of wheeling round the French army and cutting it off from its base. With this already in their minds, the German authorities at once ordered a *Division* forward to hold the passage of the Moselle ;

and in this move we see what a victorious army can venture against its adversary. Notice here how the armies were all so arranged as to support each other, and thus precluding all risk of disaster from a flank attack by the French.

Here again the Prince calls attention to the clear, concise orders issued which yet foresaw every possible variation, and arranged for meeting it.

Dealing now with the French movements, he says, that if the retreat to Verdun had been carried out at once (on 12th August) in the manner described further back (in dealing with retreats generally) it would undoubtedly have succeeded, but Bazaine, though he took command on 12th was still hampered by the presence and gratuitous advice of the Emperor; and, further, thanks to the German Cavalry screen, he was practically ignorant of any German movements. We may add to this that the French, having lost what may be termed the "strategical command," were hampered and controlled by the German troops.

We may find here too, useful lessons on the use of Cavalry, both as a strategical "screen" and as a source of information. He points out the example of how necessary "unity of command" is, and how the very presence of a superior hampers the commander by his gratuitous advice.

Examining now the positions of troops on 13th and 14th August, we may notice the care with which the event of defeat by the French, had been provided for, the six Army Corps being close to the French, supported by one, the 2nd, within easy reach.

The retreat of the French being ordered on the 14th, a simple calculation would have proved the impossibility of all the troops being retired in one day and *only* those which were nearest Metz should have been set in motion, the remainder hiding the movement and guarding the rear, instead of all being set in motion at once, blocking the roads, announcing the retreat to the Germans and giving them every chance for an attack. This chance was immediately taken advantage of by the Commander of the 1st Army Corps, who, in ordering the attack, assumed what the Prince calls, the "obedient initiative" in the *full sense* of his concise orders from head-quarters. The result of this was a *strategic* victory for the Germans, who attained their end in "holding" the French before Metz.

The German intentions before the 14th had been to mass the troops east of the Moselle, keeping touch of the French west of it, by Cavalry, but on the 15th August the order "Press pursuit on Metz-Verdun road" was issued, on which the troops (except 1st and 7th Corps) were all moved across the Moselle (indirect pursuit—see below). On this day the Cavalry had discovered the French near Rezonville, and it became imperative to attack and cut off his retreat. In the consequent moves we may notice how thoroughly all the possible lines of retreat of the enemy were studied and dealt with, the Guard Corps and 4th Corps being pushed well to the west, it being uncertain how far the French might have gone in their retreat. Bazaine in failing to drive back the Prussian Cavalry or to leave a strong rear guard on his south flank

and rear, was probably unaware of the German movement west of the Moselle and did not expect them there. The Prince now deals at some length with Bazaine's personal characteristics, and points out how he was probably unnerved by personal experience of the defeats and loss of his troops.

Even after the 16th, the Germans were still uncertain of the actual whereabouts of the French, and all the troops were being massed for the decisive engagement, when on the evening of 17th, it was finally known that all the French were near Rezonville and Mars-la-Tour, and by that time seven Army Corps and three Cavalry Divisions were assembled. With regard to this massing for the decisive stroke it is important to note how the troops moved on as broad a front as possible, so as to be more quickly concentrated for an expected battle than could be possible if marching in a long column on one road. The French, by wheeling back to the right, did exactly what the Germans had been trying to force them to do, the consequent defeat driving them back into Metz and away from their original base (Verdun and Paris), St. Privat being the first *decisive* battle of the campaign, the Prince does not deal further with the campaign, according to his plan of study. He mentions as worthy of notice an example of how the German commanders acted occasionally on their own account (even in partial disobedience of orders) when it was evidently of importance to do so. The Guard Corps, ordered by Prince Frederick Charles to march on Verneville, was diverted on St. Privat and St. Marie on information received by its commander, thus, by filling up the space between itself and the 12th Corps, avoiding what might have been a catastrophe. This move was later on approved and applauded by Prince Charles.

His last chapter is devoted to generalities of strategy exemplified in the campaign.

Pursuits.—Various examples are found during the days of August, the Germans practically pursuing on the 14th, 16th, and 18th. The pursuit of a spontaneously retreating enemy requires considerable care in execution, for he is capable at any moment of advancing to the attack in force.

A *strategical* pursuit, as differing from the tactical (which may generally be said to end with nightfall) should be a double one, *indirect* and *direct*, thus avoiding the waste of the whole strength against the rear guard.

A retreating force, which is tactically the strongest, should be "followed" not "pursued." This was exemplified after Weissemburg, when the defeated troops fell back on a whole unbroken army, the same again after Wörth. Spicheren affords another example, but on a larger scale. As soon as the Germans had massed sufficient troops, the "following" was converted into "pursuit," the 1st Army representing the *direct*, the 2nd the *indirect*, the former "holding" the French before Metz, whilst the latter cut them off.

This question of "holding" a retreating force is easier than apparent, for though the retiring enemy is on the move he is hampered by his "train" in front, and a bold *direct* attack will inevitably bring him to

a halt. This direct attack was considerably hampered by the presence of Metz in rear of the French, and thus the Germans very rightly devoted most of their attention to the *indirect* attack.

The failure of the French may be traced primarily and chiefly to—

- (a). Faulty massing of troops.
- (b). Too great a desire to gratify public opinion, leading to the declaration of war before they were really ready.
- (c). After the opening of the campaign, when it was evident that the defensive offered the only chance of success, a hesitation to retreat at once well to the rear (Châlons or Metz), for fear of public opinion, thus leading to perpetual defeat in detail and final disaster at Metz. We have seen how this gradual retreat had, by the 14th, deprived Bazaine of the "strategical command" of his army and prevented him escaping impending destruction.

With a few pages of dissertation on political interference in military matters (possibly of great interest to us in these times), but not affecting the question of strategy generally, the Prince closes.

I would only add that should this review appear too disconnected to be read alone with interest, any detailed account of the war up to the date of St. Privat, would suffice to fill in the blanks and explain the reasoning of the Prince, but by following out the book in the original, the lessons would be naturally more instructive and more interesting, and anyone wishing to study strategy, no clearer or simpler means could be devised than to read Prince Kraft's two volumes on this and other campaigns.

NOTES ON "OBSERVATION OF FIRE."

(Continued from page 115, Vol. XVI).

BY

MAJOR C. M. WESTERN, R.A.

I FIND my remarks on this subject, which appeared in the March Number of the R.A.I. Proceedings, do not make quite as evident as I could have wished the simplicity and ease of making good observations. This is, no doubt, owing chiefly to defects in my manner of presenting the subject, but it is also partly due to the considerable number of misprints that occur in the paper (owing to my having had no opportunity of correcting the proofs, being in India), and also partly to the explanatory plates having been so much reduced in scale that they are scarcely legible. I do not know, however, that it would have been worth while drawing attention to the matter, did I not think that I could add a few more useful words on the subject.

In the paper to which I am alluding, I gave rules for working without instruments, but I said that much better results could be obtained with their aid. The instruments I advocated were plane tables, with their ordinary accompaniments of rulers and compasses. Unfortunately these also necessitate the use of paper and pencil. Now paper and pencil marks get into rather an unworkable condition under heavy rain, and though I am still of opinion that better and more accurate results can be obtained in this manner than any other, *under favourable conditions*, I think we should be provided with a system that is workable under *any* conditions.

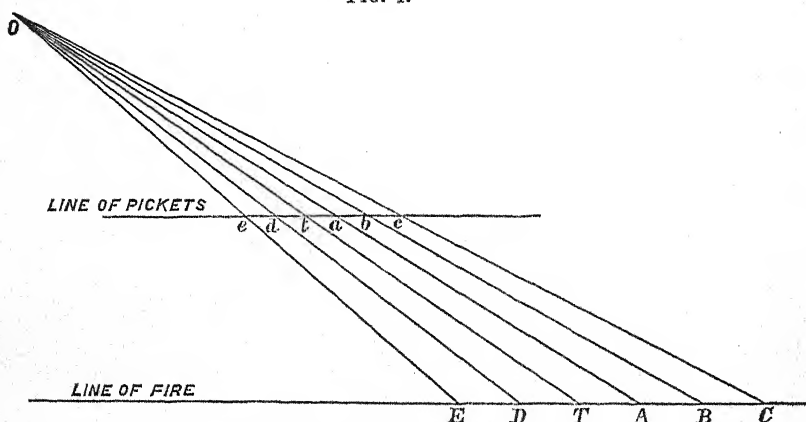
In my previous paper I said, that when working without instruments, pickets should be put out at right angles to the line leading from the observer's position to the target. Now there is one great objection to this system, and that is, that the distances right and left, observed and telegraphed by the observer, are very different from the distances under and over, into which they have to be converted, and what is worse, the two have not even a constant relative proportion.

Example:—Let us suppose that the range is 2500 yards, and that the observer has taken up a position 1000 yards to the front, and 900 yards to the right flank, and that he has put out his pickets so as to correctly cover 50 yards on the line through the target at right angles to his position. Shots which fell on the prolongation of the pickets on the line of fire, and which would be telegraphed by him as respectively 50, 100, 150, 200, 250, and 300 yards left, would in reality be 100, 210, 290, 370, 440, and 500 yards short, and ones telegraphed by him as 50, 100, 150, 200, 250, and 300 yards right, would in reality be 110, 230, 370, 530, 700, and 900 yards over.

Now it will be seen at a glance that the differences between the numbers telegraphed and the real distances under and over are very considerable, and the officer at the battery has no means of converting them *accurately*, for I have premised that pickets are only used when it is not possible to use instruments; and as a matter of fact this system of observation is chiefly useful to give information on the points (1) whether a shot is under or over, and (2) whether it is a good deal under or over, enabling the C.O. to decide whether to make bold or only slight alterations.

If, however, instead of putting up the pickets at right angles to the line joining the observer's position and the target, they were put up parallel to the line of fire, it will be seen at once that if the pickets are at equal distances they will cover equal distances on the line of fire (Fig. 1), and all necessity for any conversions at the battery is done

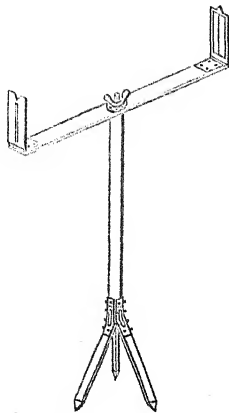
FIG. 1.



away with at once. But how is this parallel line to be laid out? It can be done quite accurately with the aid of a prismatic compass, or even with an ordinary compass with a little care. All you have to do is to take the bearing of the target from the battery, and on reaching the observing position, to put out the pickets on the same bearing; then place yourself on the prolongation of the line leading through the centre one from the target, and you're ready. I think, however, it is of considerable importance to have a means of shooting and fixing exactly where the shot falls; otherwise the eye unconsciously follows the smoke more or less. For this purpose, I think the following little contrivance would answer well:—A flat piece of wood about three feet long with two tin sights about six to nine inches long, which will fold down on the wood (Fig. 2). The sights have a slit and wire as with plane-table rulers. It is pivotted on an upright in the centre, from which it can be unscrewed for portability. On the shot being fired you fix its first graze with it, and then look down to see on or between which pickets it is bearing. In this way you get considerably greater accuracy than if the whole thing had to be done instantaneously, on the graze of the shot, by the eye.

This instrument (which I will call a rule-sight) can be easily carried rolled up with the bundle of pickets shown in Fig. 2 of my previous paper. But if thought desirable, the pickets can be done away with

FIG. 2.



and replaced by a tape, marked in $\frac{1}{4}$ yards from each side of the centre. Only one picket or a plumb line would then be necessary which would be moved until it came in the line on which the sight bore, and the number above which it stood on the tape read off. The distance at which the observer places himself (or his rule sight) from the pickets (or tape) is determined in the same way as I previously explained. If his pickets were at fixed distances apart of (say) nine inches, and his distance from the target was 2000 yards, he might place himself at a distance of 20 yards from them = $\frac{1}{100}$ th of the distance. The pickets would then cover 100 times nine inches on the line of fire = 25 yards. (Nine inches is probably about the best distance to have the pickets apart, as it is an easy fraction of a yard, in which distances are always reckoned. The tape could, of course, be more minutely divided if desired).

Here then is a system which requires no paper or pencil, no calculations or conversions at the battery, is not interfered with by the weather, and requires no instruments (except the compass) which cannot easily be made up in the battery. It is, I think, specially suitable to horse and field batteries on these accounts, and because the time occupied in taking up the observing position need be but very short. All that the observer has to do, is to take the bearing of the target from the battery, gallop out to his position, lay out the pickets or tape on the bearing, and place himself at a suitable distance from the centre one. I may observe here that the little instrument termed the rule-sight will materially assist in laying out the bearings. Lay the rule-sight on the target, place the compass on it, and note the bearing. Put them down again at the position, revolve the rule sight till it is on the same bearing as before, and lay out the pickets or tape on this line. If done in this manner, an ordinary, or a plane table compass would serve as well, if not better than a prismatic one.

It must be remembered, however, that with this system, it is necessary to estimate or judge the distance the observer is from the target, and consequently the distance that each picket covers on the line of fire.

It is here that the superior accuracy of the plane table comes in. It measures these distances for you exactly, and were it not for the objections I have already referred to, *and* the time taken up in preliminary preparations, the plane-table method would be the best. But if there was a means of ascertaining the correct distance of the observing position from the target (with what I may call the picket system) this objection would be got rid of.

Now most batteries have two range-finding instruments in their possession, or if not a Weldon range-finder is not an expensive instrument, and is very portable, and well adapted to this purpose. If one of the range-finders accompanied the observation party, the distance of the target from the position could be obtained with quite sufficient accuracy, and then, I think, very nearly, if not quite as accurate observations could be made with this method as with the plane table. But even if only one range-finder be available, it should be allowed to accompany the observation party. What the C.O. really wants to know is, not the true range, but the distances under or over from the object aimed at, that his shots fall. If he *knows* this and knows his guns are properly laid, (a subject I hope to touch on at some future time), he can make the necessary corrections, and *ensure* hitting the target next time (subject of course to the error of the gun).

If we can *ensure* hitting the object aimed at, we have solved the greatest problem with which we have to deal. We cannot ensure it unless we *know* where our shot are falling. I have endeavoured to suggest means by which this can be ascertained, at all events, with some degree of accuracy, but I have little doubt that when the importance of correct "Observation of Fire" has been generally recognised, practical experience will suggest many improvements, and I think that we may hope that a system will be evolved that will not only enable us to place our shots exactly where we desire, but will let us *know* that we are doing so, instead of only hoping and thinking it is so, perhaps to find afterwards that they have all been wasted.

P.S.—I need hardly say that a telescope with cross wires on a pivot at the observing position would be an improvement, as it would bring out the point of impact or burst with greater clearness, but I have confined myself to the simplest and least expensive methods.

PRÉCIS
AND
TRANSLATIONS.

“THE EMPLOYMENT OF ARTILLERY IN MASSES AS
REGARDS ITS HISTORICAL DEVELOPMENT AND TACTICAL
IMPORTANCE ON THE BATTLEFIELD.”

From the “Neue Militärische Blätter.”

TRANSLATED BY

CAPTAIN E. S. MAY, R.A.

WHEN we speak of employing Artillery in masses, we mean the concentration of a larger number of pieces than are contained in the tactical units for the attainment of some definite end. Such a method of employing them is no new idea; for neither modern ideas about the fire combat nor modern tactical knowledge are necessary to enable the advantages to be seen that may be derived from the concentration on a single point of many guns, and the heavy losses such a use of the weapon, most effective for destruction, must entail on the particular part of the enemy's position which is chosen for a target.

Gustavus Adolphus concentrated his great batteries in action in this very way, and Frederick the Great's endeavours always aimed at a similar handling of his Artillery.

“The fewer guns brought into action the more human blood has to be spilt.” If under the Great King, such tactics remained still in their infancy, it was not because their worth was unrecognized, but because the meagre technical knowledge of those days did little to aid their development, and prevented their general adoption.

The smooth-bored guns had neither sufficient accuracy or range to permit of Artillery firing over the heads of the Infantry on their own side, and positions for Artillery had therefore to be selected where they would interfere as little as possible with the Infantry advance. Naturally enough, such positions were often only to be found at intervals along the line of battle. Moreover, a certain fixity of position is required to thoroughly develop the advantages of concentration; a position once taken up must not be lightly abandoned.

Now, to carry out such tactics successfully, the guns must be possessed of so great a range that, however much the tide of battle may surge to and fro, they need not be in a hurry to change their positions. Yet, although there was seldom space for the employment of his Artillery in masses, we observe that Frederick never forgot the fundamental principle of keeping the fire of his guns concentrated as far as possible on one target.

It was not the number of the guns brought together, but the way in which positions were taken up, and the uncompromising way in which the same point of their foe's line was adhered to for a target, that forms the chief characteristic of the handling of Frederick's Artillery on the field of battle. They endeavoured to produce a decisive effect by a rapid fire at short ranges. Now, to accomplish this, it was absolutely necessary that the Artillery should march near the head of the column, and should be possessed of considerably mobility, and the defeat of Kunersdorf was in a great measure due to the fact that in this respect the guns were still “somewhat to seek.”

In spite, too, of the inevitable and often considerable separation of batteries, we find that in all Frederick's battles almost a concentrated effect was produced. This fact speaks volumes for the intelligence with which they were commanded, though doubtless such good results were only possible under the circumstances in an age where the course of an action might more clearly be foreseen and provided for than now-a-days. The King could pretty well decide beforehand the exact positions his batteries were to take up, and the way in which his attack was made showed tolerably clearly what the course of events would be.

When it was known before the battle which of the enemy's flanks was to be assailed, it was not a very difficult matter to bring the Artillery early into action against it. Often and often the guns were so exposed in the long preliminary march, that against any but an incapable and unenterprising Cavalry, such a manœuvre must surely have ended in disaster. (Mollwitz, Rossbach, Leuthen).

During this last battle, where we may also see an excellent example of the celebrated oblique line of battle introduced by the King, there are some interesting phases in the handling of the Artillery to be noticed :—

(1.) An early development of a powerful Artillery fire against the wing of the opposing Infantry selected for attack.

(2.) The formation of a strong battery to oppose the enemy's Artillery (on the Mühlenberg).

(3.) The advance of the Artillery "*pari passu*" with the Infantry. (First of all to Sagschütz, and then to the Mühlenberg).

(4.) No reserve of Artillery is set aside. Rossbach shows in the same way the concentration of 18 guns into one battery (on the hill of Jaunsberg).

The splendid results obtained by the fire of these guns is a feat of arms which is perhaps too little lauded in history, compared at any rate with the much be-praised deeds of Seydlitz's Cavalry. Had it not been for the confusion they occasioned, although only for a short time, in the enemy's ranks the charge of the Prussian Cavalry would scarcely have been as decisive as it was.

The battle of Kunersdorf likewise furnishes an example of the employment of the Artillery of that period in masses. At that battle three batteries of about 20 guns posted in somewhat widely separated positions on the Klosterberg, Wachsberg, and Spitzberg, cannonaded the Russian left, which rested on the Mühlenberg, with excellent effect, especially so in the case of the battery on the Spitzberg.

The defective organization of Frederick's Artillery however formed the greatest obstacle to its consistent employment in masses. No regulations on the subject existed, and there were only a few instructions (in their own way, however, quite exceptionally good), which inculcated the pounding of the point of attack with masses of Artillery, uniformity of direction, and the formation of an Artillery Reserve. The greater mobility of the "Regimental guns," and the unwieldiness of the guns of position prevented these instructions being fully carried out.

It is the merit of Napoleon that he succeeded, at any rate to some extent, in getting rid of many difficulties of organization, but the constant wars he was engaged in left him neither time nor leisure for a thorough re-organization of the Arm, although he more than once contemplated such an undertaking.

In spite of the evil experiences which the French suffered at the commencement of the wars of the revolution, owing to the defective organization of their Artillery already alluded to, they could not bring themselves easily to break away from the old system of Artillery attached to a regiment, and at the battle of Pirmaseuz the "regimental" were placed in position between "the position" guns.

Another advance in tactics introduced at this time furnished an additional

obstacle to the employment of Artillery in masses. The advance to attack in column no longer rendered it possible to decide on the positions for Artillery much beforehand, and they had to be taken up as opportunity offered during the development and progress of the action, yet the prompt accomplishment of the orders then given was often impossible owing to the unwieldiness of the pieces. But the nature of the tactics of those days, and the advance of large masses to the battlefield led Napoleon to employ his Artillery in masses too.

"Victory will be his who understands how to bring a great mass of guns into action unexpectedly."

His first experiences, however, in a change of organization were by no means agreeable. The combination of different calibres in one battery robbed the Divisions at Austerlitz of all their 12-prs., which had been called together for the formation of one vast battery. The enterprise displayed by the French Artillery thus collected in masses during the wars of Napoleon, their advance, as at Friedland, to within the shortest ranges of the enemy, placed them often in very precarious situations, but frequently determined the fortunes of the day, as during their campaigns in Spain.

At the battle of Wagram, Lauriston massed 102 French guns between Aderklaa and Breitensee against the Austrian centre to prepare the way for the assault by MacDonald's great column. A new change in Artillery organization was the outcome of the experience gained in this battle. Each corps set aside an Artillery Reserve of at least 24 pieces in addition to the Divisional Artillery, and the Artillery of the Guard formed an Artillery Reserve for the whole army.

The fire of 102 guns was concentrated against the Bragation entrenchments at Borodino, and 101 guns cannonaded the Rajefski redoubt at the same battle. This battle shows, like that of Waterloo, that a general Artillery Reserve for the whole army is not necessary. It hardly ever is used in mass, and generally acts merely as a reserve from which to replace disabled guns in the front line, as was the case with the French on 16th of August, 1870.

The chain of epoch making changes in Artillery organization comes to an end with the Napoleonic period. In later years its employment in masses was carried to an excess, and beyond the point its organization rendered desirable.

Modern views on the tactical employment of Artillery are based on the experiences and lessons of the two greatest masters in the art of war, Frederick the Great and Napoleon.

The campaign of 1870-71 was noticeable amongst other things for the decided preference shown by the Germans for the employment of Artillery in masses, especially so at the battles of Wörth, Mars-la-Tour, Vionville, Gravelotte, and Sedan.

Modern views have extended as regards this subject in the directions we will now indicate:—

1. It is no longer a matter of cannonading *one* point of attack, or target, but, in the case of a battle in which hundreds of thousands of men may be engaged, there will be several points on which it may be necessary to concentrate fire as the progress of the action may dictate.

2. Ranges have considerably increased, and a crossing, oblique, or often even enfilading fire may be concentrated on one target in addition to that from the direct front. Changes of position to cannonade a more distant target which may suddenly appear during the battle's course, will be less necessary than formerly; and lastly—

3. The vast increase in number of the guns renders their employment in masses an absolute necessity. Since they cannot fire over one another, the guns must be placed side by side; and since the whole Artillery of an Army Corps must get into position within the front it occupies, which would be about one-

fourth of a mile,¹ and as there are about 100 guns with usually 20 paces between each to be provided for, we see that the guns would want nearly as much front as the whole Army Corps itself requires, and can readily understand how concentration in masses has become no longer a matter of choice.

It was for this reason that especially in the first battles of the campaign of 1870-71, which were generally the result of no preconceived plan, the whole Artillery were often brought into action all together, and at the same moment, in order to extricate the advanced guard who had pushed forward in too headlong a fashion, and to allow the main body to come up in well organized formation. (Colombey-Nouilly).

There are, however, many difficulties in store for the commanding officer of the Artillery which is thus to be massed.

1. The heavy fire renders the issue and understanding of orders at a distance difficult.

2. It is hard to ensure good practice, as it is not easy to distinguish the effects of one's own shells from those of a neighbouring battery, which is very likely firing at precisely the same target.

3. It is often difficult to get certain distant batteries to cease firing just at the right moment, when the Infantry of one's own side are getting close to the enemy's position.

To overcome these obstacles, which will otherwise very probably bring about a want of method in the employment of Artillery in large masses, and thus perhaps rather check than assist the operations of the rest of the army, a sound and uniform system of direction of the whole line of Artillery must before all else be adopted. This can be easily enough, and as a matter of course attained in the case of the smaller bodies, but as soon as the Corps Artillery has become amalgamated with the Divisional guns, the "Artillery Brigade commander" must assume the direction of affairs. Should the Artillery of several Army Corps find themselves in position beside one another, the command of the whole must be assumed by the Officer Commanding the Artillery of the army, or if he be not present, by the senior Artillery Brigade commander on the spot. Of course the direction of this chief commander of the Artillery must be confined to general instructions, the carrying out of which in detail must be left to his subordinates. In directing the fire care must be taken that the whole of the enemy's line of Artillery is brought within its range, while it is concentrated on certain individual batteries, such as those which are the points designated by the chief commander of the Artillery as targets for a concentrated aim.

Great care must be observed in telling off batteries to their various rôles.

We may close with a short *résumé* of the views we have expressed :—

1. The growth and continued advance of Artillery science has increased, and will continue to increase the necessity for its being employed in masses.

2. It is impossible in the case of battles between great armies not so to employ it, because of the small space usually available for the large number of guns.

3. The more the difficulties of such a use of it are increased, the more necessary is it to strive for a good and uniform system in directing fire.

In this way, will Artillery always be enabled to fulfil its rôle of commencing the engagement, of destroying the hostile Artillery, and ultimately of shaking the enemy's Infantry, and thus, if it do not actually gain the victory, it will at any rate pave the way which leads directly to it.

Lastly, it will materially develope and enhance the triumph by pursuing with a heavy shell fire the flying foe.

¹ One Prussian mile = 8238 yards.

QUICK-FIRING GUNS FOR LAND SERVICE.

FROM

"Mittheilungen über gegenstände des Artillerie-und Genie Wesens.

TRANSLATED BY

CAPTAIN L. C. M. BLACKER, R.A.

THE employment of quick-firing guns, which up to now has been confined almost exclusively to the sea service, seems lately to have acquired importance even in the domain of land artillery; not only the literature of the day which is more inclined to follow the momentary and rapidly changing aspects of military questions, than the professional journals themselves, but even the latter find it necessary to turn their attention to the employment of quick-firing guns in the field, in mountain warfare, and in fortresses. Under such conditions the question presents itself; what importance may be well assigned to quick-firing guns¹ as regards their employment in the field in general, and how the probabilities stand as to their introduction into the service?

We will endeavour to answer these questions in the following pages, and we will base our observations on the conditions of the attack and defence of fortresses, in view of the circumstance that up to the present the employment of quick-firing guns has only been discussed or experimented on, by any power, with reference exclusively to their employment in fortress warfare and not in any way touching on mountain warfare or warfare in the field.

In this case the necessity for quick-firing guns began to make itself felt, as it dawned upon everybody that the increased effect of the modern artillery of the attack could only be counteracted with any prospect of success, by corresponding modifications in the existing art of defence.

The perfection of curved fire from guns, the adaptability of shrapnel to curved fire, as well from guns as from howitzers, finally the employment of shells with destructive bursting charges placed the attackers in a position to make open emplacements in the long run perfectly untenable. Furthermore they could at long ranges entirely destroy those parts of the fortifications, which should retain their inviolability up to the last stages of the defence, they can annihilate early the defensibility of those works and give to important enterprises, the greatest prospect of success.

Modern fortification thus recognises the necessity of keeping fortified objective points as small as possible, covering them in securely with bomb-proofs, of eliminating as much as possible all obsolete means of defence, (such as blindages, casemates, traverses, &c.) and of making the most extensive use for protecting from fire assailable points. Neither infantry fire, nor machine gun fire, nor artillery fire could be rendered applicable for this object. The admission that none of these modes of fire perfectly fulfils the object in view, has originated the idea of em-

¹ We understand by quick-firing guns, those quick-firing weapons, of which the calibre is larger than that of the rifle in use in the service, while we include those quick-firing weapons, of which the calibre is within the calibre of the service rifle, under the designation of "Mitrailleuses or machine guns."

ploying quick-firing guns for this aim, and thus gave to the question of the employment of quick-firing guns that importance which is accorded to it now-a-days. In fact the employment of infantry fire for this object cannot be entertained, since its use would necessitate the construction of the smallest possible mark and make the over-head cover for the same almost impracticable. Besides small-arm fire suffers from the great disadvantage with reference to its special employment in this case of too small a range, a drawback which mitrailleuse fire suffers from as well. The effective range of small-arm fire cannot be considered as extending beyond 1000 metres, beyond this distance its effect diminishes rapidly, and at 1500 metres is almost nil. Below 1000 metres small-arm fire is certainly somewhat superior to artillery fire, but this superiority is on the one hand not so very great and on the other hand artillery fire possesses, in this sphere, as opposed to infantry fire, many advantages,¹ which must not be under-valued. Thus for the purpose of sweeping the advanced ground of fortified positions, with the object of receiving the same from enterprising inroads, we must certainly fall back on the fire of artillery. As the question however deals with combatting living objects only, the complete appropriateness of artillery fire to this end cannot be doubted.

If under these circumstances the introduction of a new weapon for this object is to be taken into consideration, this could only be done in the expectation of extraordinary advantages in comparison with existing systems. These advantages must, if they are to be recognised as such, necessarily evince themselves in the *action of the gun*, in that either a considerably greater fire-effect is attained with the weight of existing guns, or that the same effect is produced with a considerably lighter piece. The fire-effect in this case however can only be measured by the number of actual hits which are obtained in a certain time at certain ranges. For in employing guns for this object, it is only a question as previously mentioned of combatting living objects, and therefore every other system (such as percussion locks and breech action) need not be taken into account. For the same reason, shrapnel must be considered in this case the chief projectile. Fire-effect as thus defined depends generally on the two factors *calibre* and *rapidity of fire*, whose mutual relation is characterised by the fact that for the attainment of a specific fire-effect, the smaller the calibre the greater the rapidity of fire. As regards the calibre of quick-firing guns, it already appears, from what precedes, according to the idea of quick-firing guns that a smaller calibre suffices for the attainment of the same fire-effect as with existing field guns. But the smallest calibre permissible for a quick-firing gun is that which will admit of the construction of an effective shrapnel shell. A simple calculation shows this to be a calibre of about 47 millim. (1"86), in connection with which it must be understood that this calibre should comply with all other conditions for use in the field, especially as regards the observation of the practice at all ordinary ranges.

Rapidity of fire is, with all systems, the product of the same factors. It is however clear that with newly raised systems, such as quick-firing guns, these factors can be better taken into account than with existing field guns. Thus a special method of closing the breech, the employment of metallic cartridges, of percussion locks instead of friction tubes, lastly the use of powerful buffers, can always insure to quick-firing guns a superiority in rapidity of fire over existing field guns under all circumstances; on the other hand these advantages are diminished by the necessity even with quick-firing guns of preparing each round by boring the fuze and laying the gun correctly before every shot.

Where however, in any way the unfavourable influence of these details can be

¹ Vide C. Sardegna's "Long Range Fire of Infantry compared with Artillery Fire," in the *Revista d'Artiglieria e genio*, July number, 1887, and in the *Armée-blatt*, No. 39 of 1887.

avoided, in cases where the chase can be placed in a fixed position, where many shots can be fired one after the other with the same elevation and length of fuze, then the favorable influence of rapidity of fire makes itself felt. With such a fixed position a quick-firing gun can develop its greatest effect, and under these conditions can hope to attain a much greater result than a field gun employed under similar circumstances. The former can however, given the same fire-effect, be constructed with a smaller calibre, and in consequence of a much less weight than the latter. With a mounting however which is intended to render the piece easily moveable, and which therefore must, for purposes of transport, be within certain limits of weight and strength, even the best recoil-checks cannot obviate the necessity of correcting the laying of the gun after every shot. Such a rapidity of fire is here not attainable, and the highest rate possible could not differ much from that of an ordinary field gun. The weight and calibre of the quick-firing gun, producing the same effect, would not be much less than that of the field gun.

This is therefore one reason why no future can be promised to the employment of quick-firing guns in warfare on the field, quite irrespective of tactical considerations.

A transportable quick-firing gun of the same power as the existing light field gun would not possess any appreciably less weight, and would therefore not adapt itself any the better as a field or horse artillery gun. If one however is contented with a smaller fire-effect coupled with considerably more favourable conditions of weight then machine guns will answer the purpose better under all circumstances. That it is so can easily be seen from the following table. For instance, as shown by experiment, the effect of the 8^{cm}. (3.16-inch) field gun of 1875 the horse artillery gun of those days, can be equalled by a 47^{mm}. (1.86-inch) quick-firing gun. The latter however in spite of its much smaller calibre, has the same weight practically as the 8^{cm}. gun.

Calibre.	Nature.	System.	WEIGHT,			Charge.	Muzzle Velocity.	WEIGHT		Number of bullets in shrapnel.	English equivalents.
			Of the gun.	Of the mounting.	Total			Of common shell.	Of shrapnel.		
Kilogrammes.			Kilog.	M.	Kilogrammes.						
53mm	Transportable Quick-firing Gun.	Gruson.	162	640	802	0.36	455	1.63	1.85	56	pr. 3.6
47mm		Nordenfelt	160	574	734	0.31	476	1.36	1.38	42	3
57mm			338	562	900	1.30	650	2.72	2.72	70	6
47mm		Hotchkiss	250	500	750	0.78	600	1.4	—	—	3
57mm			350	550	900	0.895	550	2.72	2.72	72	6
8cm	Field Gun.	Of 1875.	299	464	767	0.95	422	4.33	4.78	105	9
9cm			487	545	1036	1.5	448	6.36	7.155	165	14
11mm	Mitrail- leuse.	Nordenfelt	58	127	185	Same as rifle.	—	—	—	ins. 455	
		Maxim	32.8	52	84.8		—	—	—		

NOTE BY TRANSLATOR.—The guns compared are the 3-pr. Nordenfelt or Hotchkiss and the 9-pr. gun, all of which with their carriages have practically the same weight, 1615 to 1690 lbs.

Truly insignificant, on the other hand, are the weights of the machine guns (mitrailleuses) as clearly appears from the foregoing table, at the same time the effect of mitrailleuses only ranges as far as that of small-arms; this fire-effect is however, as stated previously, superior to that of field guns at ranges below 1000 m., and also possesses the great advantage of *continuity*, which from a tactical point of view is important; so that in this point quick-firing guns can but little better comply with requirements as a good field gun, than a machine gun or mitrailleuse.

From these premises it follows therefore that quick-firing guns *can only develop superior advantages over field guns in fortresses, and this only for sweeping the advanced ground from previously prepared fixed mountings. But that where mobile pieces are required, quick-firing guns can hardly enter into earnest competition with existing field guns*, particularly if the latter are by means of powerful buffers, shields against infantry fire, &c., specially adapted for the purpose, and finally that in all cases where it is only a question of sweeping the immediate foreground within the range of infantry fire, mitrailleuses (or machine guns) are much to be preferred to quick-firing guns¹

The question whether, in the first case, the advantages derived from the use of quick-firing guns are so great as to call for the introduction of a fresh nature of ordnance can confidently be answered in the affirmative, if a greater fire-effect is not demanded from the quick-firing gun than from the existing field piece, much more so as the capability for the defence of the existing field gun is ample enough. Other important considerations demand the introduction of the quick-firing gun, i.e. (1), with quick-firing guns the requisite fire-effect, as stated, is obtained with a much smaller calibre than with the field piece. This diminished calibre however, facilitates the handling and serving of the piece and allows besides, which is very important in the spirit of modern fortification of an extreme reduction in the size of the mark offered by the gun emplacement.² (2). For the attainment of the same effect more shots would be fired in the same time from the quick-firing gun, and therefore the moral effect, caused by the rapid succession of shots, would be considerably greater with the quick-firing gun than with the field gun. (3). The employment of quick-firing guns would be more economical, since the same result is attained with a less costly piece. Similarly the total outlay would be reduced owing to the diminished size requisite for the emplacements.

Against the introduction of quick-firing guns for the use indicated, must be considered the inevitable complication in the fitting out of fortified places. Much as we may desire to avoid any unnecessary complication in this direction still they must tell the less in the balance since even field guns require certain adaptations before they can be used in such situations, and these adaptations are accompanied by almost the same drawbacks as the introduction of a new system.

Interesting as it might be, to watch and follow up the endeavours which up to the present, have been made in different countries for the construction of the best pattern of quick-firing gun, still we must, for particular reasons, impose restrictions on ourselves in this matter, and we will confine ourselves to noting that not only are researches and experiments being carried out in almost every country, by the military authorities, but also that even private establishments, especially

¹ NOTE BY TRANSLATOR.—This seems greatly opposed to Mr. Nordenfelt's views.

² If an equal fire-effect is taken as basis, the 9cm. gun of 1875 can be compared with 53mm. quick-firing gun (on a fixed mounting). The over-head iron shields for both guns have for the first a diameter of 2.5m. and for the second a diameter of 1.0m. giving a surface of 5 sq. m. and 2.01 sq. m. respectively. From the practice of the 15cm. (6-inch) rifled mortar, it appears that under favourable circumstances at a range of 1500m., 80 shots would be required to hit the first shield, and 200 to hit the second.

the "Grüison" firm at Buckau near Madgeburg, the "Maxim Gun Company" in London, and the "Société anonyme des anciens établissements, Hotchkiss & Cie," at Paris, are endeavouring, with the help of their wealthy appliances and resources to give the question of the quick-firing gun a prosperous solution.

At the same time, as long as a perfectly satisfactory and approved pattern of quick-firing gun is not yet to hand, it is natural that for the purpose of sweeping the advanced ground of fortresses, in order to preserve their freedom from inroad, we must fall back on existing field guns, both for use on fixed mountings and for use where mobility is required in the field.

HAUPTMANN JULIUS MAUDRY.

VIENNA,

20th October, 1887.

NOTE BY TRANSLATOR.—From the foregoing it will be seen that the writer advocates the employment of quick-firing guns in the defence of fortresses for sweeping the advanced ground and presumably preventing the breaking of ground and the opening of trenches. Certainly in cases where a rapid and accurate fire is required on such points as sap heads and on points where the assailants are endeavouring to establish batteries, quick-firing guns on fixed mountings would seem invaluable. The elevation and direction could be obtained in the daytime, and where an extremely rapid fire for a short time is essential to prevent the assailant from effecting a lodgment, a future seems to open up for quick-firing guns of all calibres, of which it would be difficult to predict the limits.

Mr. Nordenfelt's idea that quick-firing guns should be advanced up with the fighting line of infantry during the final stages of the attack, would appear to be negated by the writer's opinions. That idea seems to have originated in the advance of the Prussian batteries up to the support of the skirmishing line at St. Privat, quite forgetful of the fact that when this pushing forward of the guns took place, the attack had been temporarily suspended and the skirmishing line (for the attackers were in battalion columns) must have been still nearly 1000 yards distant from the French position (*vide* the Duke of Würtemberg's account). (Home's Précis, p. 75). Even then the batteries suffered terrible losses. If any weapon were suitable for the purpose Mr. Nordenfelt advocates, it would be light pair-horsed machine guns. They alone from their light weight, could carry the large amount of ammunition requisite and the iron shields necessary to protect their detachments at close ranges from the infantry fire. Their small teams alone would stand a chance of getting into position, especially if arrangements could be made that the loss of one horse need not necessarily cause the complete stoppage of the piece. Swarms of such guns dashing forward and pouring in a heavy fire at close range at a critical moment of the attack might often ensure its success.

17th Letter.

THE QUESTION OF ORGANISING CAVALRY DIVISIONS DURING
PEACE.

YOU are quite right in thinking from the conclusion of my last letter, that the leaders of lines should be given every possible opportunity of working their commands in division, and the wish, which I have already expressed in an earlier letter that the cavalry might be ordered to serve up to the 1st of November, so that they might, after the great autumn manœuvres, find sufficient time in October to practice the exercises of cavalry divisions, is a proof that I agree with you in this matter.

But when you further say that you are of opinion, that we must consequently of necessity have cavalry divisions permanently organised in peace, in the same manner as they would be before the enemy in case of war, I am somewhat inclined to differ with you, for there is quite as much to be said against such a principle as for it.

If the cavalry divisions were organised in time of peace exactly as they would be in war, then, since the infantry divisions also need divisional cavalry, we should be obliged, after deducting a cavalry regiment for each infantry division, to collect the remaining cavalry into divisions, each of six regiments. From this arrangement would in course of time spring two kinds of cavalry, the cavalry divisions and the divisional cavalry. The former, being organised in large units and living in an atmosphere of its own, would after a certain time look down with a sort of superiority on the isolated regiments who were told off to the infantry divisions, and the army would come to form an idea that there were two classes of cavalry, and thus a distinction would be drawn, which could in no way assist the general development of the arm. For nothing but a comradeship of the entire arm, animated however by emulation, can forward the development of the arm as a whole.

Moreover this distinct separation into cavalry divisions and divisional cavalry has no existence even in war. The regiments frequently interchange and relieve each other. This would be simply impossible, if a difference of organization existed in peace, and they each underwent a peculiar course of instruction.

I think that it is much more desirable that the whole of the cavalry should every year be practised in division, and should further every year learn the duties of divisional cavalry by being attached to the infantry. But if permanent cavalry divisions existed in peace, and were entirely separated from the divisional cavalry, this double training could not be kept up; the divisional cavalry regiments would then never take part in the great cavalry manœuvres, while the regiments of the cavalry divisions would never share in the manœuvres of all arms.

The whole of the cavalry of each army-corps might be collected together with the object of assembling them in cavalry divisions, as has been done

already in the case of the Guard corps, and of the XII. and XV. army-corps. But by so doing we should, in the case of the other corps, work directly against the principal object which it is desired to attain by the union into cavalry divisions, namely, to bring the peace organization into harmony with that for war, and thus to facilitate and hasten the passage from the one to the other. Since we have as a rule only five, and at most six, cavalry regiments in each army-corps, and must from these give a regiment to each of the two divisions, we could not in war provide as many cavalry divisions as we have army-corps, unless we are willing to allow the formation of cavalry divisions of the strength of only three regiments. That would be absurd. Then why is it that in time of peace there are only two cavalry divisions in the Prussian army? Because only two of our army-corps have eight regiments of cavalry. These can therefore in war give a regiment as divisional cavalry to each division, while the remainder take up their war organization in a complete unit, just as they were in peace.

Some hot cavalry soldier will perhaps on this ground propose that we should organise more cavalry, say, eight regiments for each army-corps. But we are not likely to augment the number of our cavalry simply in order to carry out this hobby of creating cavalry divisions in time of peace. The proportion of cavalry to infantry depends upon quite other considerations, and these are of far greater moment than the mere formation of independent cavalry divisions.

In addition to the demand for the formation of cavalry divisions in time of peace, there is some talk in cavalry circles of an organic separation of these divisions from the army-corps, and of their union in cavalry inspections, which should be placed under an inspector-general of cavalry. It is an extraordinary coincidence that this cry from the cavalry for such isolation should arise at the very time when the whole of the artillery has expressed the desire to exchange their isolation for a closer connection with the army-corps. This phenomenon alone causes grave doubts as to the practical value of such an enormous change; for the desire of the artillery for a more intimate connection by organization with the other arms in time of peace, proves that isolation also has its disadvantages. We must moreover remember that we have historical precedents for such an organization. Frederic the Great created similar inspections of cavalry after the peace of Hubertsburg. He himself was the inspector-general of cavalry. This organization did very well so long as such men as Seydlitz, &c., lived, who could breathe life into its form. But at a later date the cavalry gained nothing by it, as is proved by their behaviour in the war of 1806. Though the latest, and most profound, historical enquiries (see Goltz's "Roszbach and Jena") have shown us that the cavalry of 1806, did not altogether deserve the bitter blame which has up to now been lavished on them, yet we cannot avoid the conviction, that the long isolation of the cavalry had a good deal to do with the fact that they did not feel themselves sufficiently at one with the other arms to induce them to stand by them and to aid them in every way.

How can this have happened? I explained in my last letter how many qualities must be combined in one man, in order to make a really good leader for a brigade or a division of cavalry, strength, youth, a good seat on a horse, staying power, sharp sight and theoretical training (qualities which frequently weaken each other, since study injures the eyes, &c.) and how very rarely a cavalry leader will possess all these advantages; the same observations will apply in a yet higher degree to an inspector of cavalry.

If the inspector be merely selected from the arm as a good regimental officer, the cavalry must and will adopt a one-sided system of training, and will at last, if peace endures for a long time, finally give its whole attention to trifles, and will exalt into importance small cavalry fancies (such as fat horses, and riding-school tricks), to the injury of the true work of cavalry in war. Until Wrangel, like a strong healthy wind, swept away all such pedantries, we knew by experience that under old and senior cavalry leaders, who had a distinguished past, such a striving after "uniformity" in every detail was made throughout the regiments under their command, as often resulted in serious injury to them all. Thus a riding-master was declared to be quite useless in the school if, at the end of a ride, he deployed his detachment along a different wall or on another front to that which they had faced at the beginning; or if he did not follow exactly the prescribed order of the various exercises and words of command. One of these officers found great fault with the fact that, while one of his regiments had straw litter in its stables, the other had not, and at once ordered strict "uniformity," though the stables of the one were on dry sandy ground, while those of the other were close to a river, of which the damp made the straw litter unwholesome, which was not the case with the former. Everything which did not tend to uniformity was therefore neglected, whether field service, practice in taking advantage of ground, or the support of the other arms in battle. Let no one say that these must have been the follies of a lunatic. I repeat that these were most distinguished officers, and I am convinced that the same one-sided ideas will grow up in steady progression in the case of a lasting peace, if the arm be not, by its very organization, convinced of the universality of its duties. But this can only be the case if the cavalry remains closely connected with the other arms, and if it continues to be attached in peace to the commands of army-corps.

It is possible to do the one and not to leave the other undone; if the cavalry neither can nor will be augmented, then the regiments of any two army-corps can in peace be collected into a division and be told off to one of the corps. In this case out of the cavalry of two army-corps would, in time of peace, be formed a division ten regiments strong, organised in three brigades; but on mobilization for active service each of the four infantry divisions must receive one cavalry regiment as divisional cavalry, and thus when on a war-footing the division would consist of three brigades each of two regiments. This would not cause any very great amount of shifting, for, if we work out this plan, we could tell them off as follows; the cavalry of the I. and II. corps, in a division of ten regiments, to the I. corps; those of the V. and VI. corps, in the same strength, to either of these corps; those of the III. and IV. corps, eleven regiments, to the III. corps; those of the IX. and X. corps, ten regiments, to the X. corps; and those of the XI. and XIV., in the same strength, to the XIV. corps; while the divisions of the Guard, XII. and XV. army-corps could keep their present peace organization. Only that division which would be formed from the VII. and VIII. corps, and which would be attached (say) to the VIII. corps, would be too weak (eight regiments), and will thus, after detaching the divisional cavalry, go on active service with a division of only four regiments, just as the XII. corps does. The expense of this change of organization would not be very great, for one brigade staff would be abolished for each divisional staff created.

But let us endeavour to realise the consequence of such a division of commands; the principle of the territorial boundaries of our army-corps

districts would be altogether broken through, great friction and conflict of authority would be unavoidable, the regulation of the reserves and the machinery of the mobilization would be much impeded and complicated, and thus the principle, which has up to now been upheld, of the greatest possible simplicity in these matters would be given up.

Moreover the cavalry, since they would no longer belong to the army-corps in whose district they would be quartered, would be isolated from the other arms ; while troops of different army-corps would rarely be able to practice manœuvres against each other (whether of a theoretical or practical nature), such as field service exercises carried out by all the troops of any garrison, &c. ; and thus all the arms would become estranged from each other, while the instruction of each would grow narrower in its scope. I can remember to have met, at the beginning of my service, an infantry regiment whose field-officers had never seen a regiment of cuirassiers. They offered this fact as an excuse for the mistakes which they made in manœuvres with the other arms. Something of this sort would occur again.

I must now touch on a point of a more delicate character. Have we, for the command of these independent divisions, a sufficient number of officers, who, in addition to the necessary experience and knowledge of their work, have also preserved their sight, their youth and their endurance in the saddle ? What would be the consequence, if independent cavalry divisions were established throughout the army ? The divisions of the army-corps would be simple infantry divisions, and would be given to infantry men only, while the cavalry divisions would be given to cavalry officers only. Any cavalry general, who had not retained the necessary youth, power of endurance and quickness of thought for a cavalry division, would be obliged to leave the service, and the army would thus lose many a practised and good man, who at the head of a division, or even of an army-corps, where it is not so necessary to be a good horseman, might, owing to his experience and knowledge, do excellent service. The present condition of affairs seems to me far preferable. We have only a few exceptional cavalry divisions, where they are necessary and possible ; otherwise the cavalry are periodically collected for practice in the exercises of cavalry divisions under the officers commanding brigades, from among whom, as judged by this test, the most skilful are selected for the mobilization of the following year. But in case of war all considerations of rank are set aside (for we have seen a general commanding the cavalry, while royal princes had the command of divisions only), and in this case the skilled commanders of cavalry divisions may be selected from the senior officers commanding army-corps divisions, and the junior officers in command of cavalry brigades. Ought we to give up this most practical system merely in order to adopt an organization, which has given no proof of its excellence, and which indeed, on the contrary, was not a success on the only occasion when it was tried ?

Is there really any such urgent necessity for organizing the cavalry divisions in time of peace ?

There are two principal reasons why this does appear desirable.

The first is the necessity of practising cavalry regiments in divisional exercises ; and the second the desirability of making the peace organization conform to that used in war, in order that at the critical moment the difficulties of mobilization may be as far as possible smoothed away. I have already shown in detail that it is absolutely necessary to practice cavalry masses in divisional exercises, and that it is most desirable that

every cavalry regiment should annually have an opportunity of taking part in such exercises ; I have moreover, I think, shown that this can be arranged. But I cannot admit that distinct cavalry divisions should therefore be organised during peace. On the contrary if, as has always been the case, the officers commanding brigades are in turn entrusted with the conduct of such exercises, many more cavalry leaders can be practised and instructed in the working of such masses of cavalry (more especially if the exercises take place in each army-corps after the manœuvres of all arms), and a choice can be made from among these at the outbreak of war.

With reference to the transition from peace to war footing, the staff of the cavalry division suffered very much at the last mobilization, while the friction and work was much increased by the fact that not only had they been but just called together and scarcely knew each other personally, but also because they had not seen any of their regiments, and did not at first know where they were. I can picture to myself the annoyance of an officer commanding a division who arrives with his staff at the end of the portion of his journey which is to be made by rail, and who has no idea where his regiments are. But in this case he has always looked for them, and found them. The officer commanding a division can have nothing to do with the transport of his troops by rail (that is managed by the railway committee of the Grand General Staff), and it would be impossible to let him know their whereabouts beforehand, since circumstances may compel changes to be made ; as a matter of fact the regiments were carefully looked after and were always found near to each other. Many staffs which had the same organization in war as in peace went through exactly the same experiences. For example, the staff of the Guard-corps started from Berlin for Homburg in the Palatinate. During the two days' journey we suddenly found that we were passing stations which were not on our line of route. When the train stopped the guard informed us that orders for the change had been received by telegraph. Shortly afterwards we were astonished and amused to find the hours for meals altered ; for example, we stopped for supper at 8 a.m., and for breakfast at 9 p.m. At last we arrived. But where ? On asking we discovered that we were at Mannheim. No one in the whole of the staff knew at first where the troops were. We sought for them (by telegraph), and found them. After a day of rest we began our march, and when, at the close of the second day, we arrived at Kaiserslautern, we found the cavalry division of the Guard there before us, though they had left Berlin after us ; we even found that our ammunition columns had already been unloaded from the railway. This sort of thing will always happen, if the enemy's dispositions necessitate changes in the railway arrangements. At any rate in this case the non-existence of the cavalry division in peace had nothing to do with the matter. Moreover at the moment of mobilization many changes are made in the higher commands, and thus many officers are strangers to their troops. With regard to this I will only mention that at the mobilization in 1870 both infantry divisions of the Guard received new commanders, and that this was the case with the majority of the army-corps. It is by no means of very great importance that the staffs of the higher commands should undergo no change on mobilization. The most essential point is that the regiments shall pass at once, easily and quickly from a peace to a war footing. Compact and well-trained regiments may without difficulty be transferred to another brigade or division. This has been often done in every arm, and has never led to any inconvenience.

It is only necessary that these regiments shall have been trained under the same system of command and in the same tactical formations as obtain in war. If therefore all cavalry regiments took part annually in the exercises of the cavalry division, and if they were practised not only in the regulation formations and in the principles laid down for the conduct of large bodies of troops, but also in marching by divisions and in the system of command in that unit, there would then be much less difficulty in collecting them quickly in brigades and divisions at the outbreak of war. In answer to the complaints which were made, at the beginning of the last campaign, of the want of cohesion of the cavalry divisions, we may say that up to that time only a very small fraction of the regiments had ever practised movements in division.

All the discussions which I have had with those who are in favour of the formation of cavalry divisions in time of peace have only strengthened me in my former opinion ; I am afraid that such an organization, however it may be carried out, must, if it be applied to the whole army, entail more evils and disadvantages than it can offer benefits.

I have in the course of my letter several times touched upon the question of an increase of the cavalry, and have suggested that the number of cavalry, which we need, depends upon quite other considerations than the peace organization of that arm.

Allow me to say a few words with reference to the number of the cavalry in proportion to that of the other arms. Various opinions on this matter are given in different text-books of tactics. For example, some of them say, that we ought to have as many squadrons as we have battalions, others that the cavalry should form such and such a percentage of the army. Such suggestions are either entirely empirical, as they used to be in former days, or are founded on utterly groundless theory. I have already remarked this in my first letter.

Now that universal service is accepted, we shall at the outbreak of war take every available horse, just as we take every available man, for the defence of the fatherland. Considering the great importance of the possession of a large mass of cavalry, and the immense advantage which a superior force of cavalry will give us at once over the enemy, in that it will blindfold him and open our eyes, will shut him in closely and give us all freedom, and will tie his hands while it will assist us to strike, we cannot have too many cavalry ; the answer to the question is therefore simple ; we must have as many regiments of cavalry as possible. If we could enquire of the committee on remounts which sits at the ministry of war, we should certainly be told, that the supply of horses in our country would not permit us to obtain annually suitable remounts for more cavalry than we have. If any other answer could be given, I am quite convinced that our government would long ago, either after the last war or at the opportunity given by the last augmentation of our regiments of infantry, have asked for the means to form more regiments of cavalry.

In a similar manner the theoretical question concerning heavy and light cavalry is a purely idle one. I learnt in my youth that the proportion ought to be, one-quarter heavy, one-half light, and one-quarter medium cavalry. I merely laugh at this now. You cannot mount heavy men on light horses. Heavy men on heavy horses make heavy cavalry, and light men on light horses make light cavalry. The Huns had no heavy cavalry, and at the time of the knights of the middle ages Germany had no light cavalry. Since we have had Arab blood in our breed of horses,

we have light cavalry, and plenty of it. Thus the proportion between heavy and light cavalry settles itself, and is forced upon the government as a necessity, not as a matter in which they have a choice.

18th Letter.

CAVALRY IN COMBINATION WITH INFANTRY.

SINCE, as I have already shown in one of my earlier letters, cavalry will, nine times out of ten, if that arm be properly used by both sides, engage the enemy's cavalry, and will only in one case out of ten attack the other arms, we cannot be surprised that their thoughts and aims are generally governed by the consideration as to how they are to act against cavalry. We may even maintain that cavalry thus prepare themselves for the decisive services which they render to the army, for it is not until the enemy's cavalry have been overcome, and either destroyed or driven from the field, that our own can ensure to the army such strategical superiority as it obtained in 1870. But it would be a serious error if we were, therefore, to conclude that the cavalry should on this ground be exercised only in divisions, and practice their action against hostile cavalry only. We must not forget that the defeat of the enemy's cavalry is only a means to the great end, and that the action which leads directly to the attainment of this end does not begin until the hostile cavalry have been overthrown. This action consists in supporting the infantry in the many various manners which have been already described. But cavalry will never be able to carry out this action properly, unless they always set to work on the fixed principle that they exist only to serve the infantry, to which they are distinctly an auxiliary arm. For this reason they must make themselves acquainted with the peculiarities, mode of action and the needs of that arm, and must therefore be constantly practised in working in conjunction with it. This combination of the two arms is just as important for the infantry, whose leaders must equally learn to know the peculiarities of cavalry, so that they may form a correct idea as to how much may be expected or demanded from the mounted arm. If this be not the case, they will in war either make a too limited use of the cavalry under their command, or will ruin them by excessive demands, or by expecting or calling upon them to do something which is impossible to them; as, for example, in the case where a general ordered his Ulans to lie down, in order to get cover from the enemy's infantry fire. This is also a very weighty reason in favour of the closest possible connection between cavalry and infantry in peace, and against the isolation of the former in separate cavalry divisions. It follows therefore that it is absolutely necessary that the cavalry (I mean all the cavalry) shall every year take part, in combination with the infantry, in the manœuvres of all arms.

You will perhaps laugh and say that what I urge is very true, but is by no means new. Yet we see, that that part of the cavalry which is exercised in cavalry divisions takes, as a rule, no part in the manœuvres of the other arms in the same year. I consider this to be a great defect. I have already, in a former letter, stated my opinion that the cavalry

might carry out both tasks, if the troopers were kept with the standard until the 1st of November, and thus extended their actual service to three full years.

The opinion has frequently been loudly expressed that, if the whole of the cavalry took part in such manœuvres as can be carried out within the narrow limits of a division, and if thus a division of 12 or 13 battalions found itself working with 10 to 15 squadrons, false conclusions would be arrived at, such as could not obtain under war conditions, when the division of 12 or 13 battalions could have only about 4 squadrons attached to it. From this fact springs the misuse which is made of the cavalry in peace, and to which in peace we grow accustomed, though it would not be possible in war.

It cannot be denied that the cavalry at the manœuvres is more numerous and more freely used than could possibly be the case in war. I have already, in one of my former letters, drawn attention to the lavish employment of officers' patrols. But is not this equally the case with all the arms? How many attacks has one and the same body of troops to carry out in one day; attacks so serious, that, if a single one of them was fought out in earnest, the troops which made it would be unfit for any further action on the same day! The greatest possible use must be made of the few days of the manœuvres for practice and instruction in the conditions of battle. Moreover it is quite within the power of the officer who directs the exercises to diminish, if he pleases, the proportion of cavalry to infantry. An army-corps, of which the 5 cavalry regiments, each of 5 squadrons, take part in the manœuvres, can tell off 4 squadrons to each division (by sending to it either a regiment of 4 squadrons or 4 of the fifth squadrons), and can then form a cavalry division of 4 regiments of 4 squadrons; this can be kept as a unit, and can be attached to one side or the other at pleasure. A division, which proposes to work its two brigades against each other, can act in a similar manner, and keep an available cavalry brigade in reserve.

It is of the greater importance that the whole of the cavalry shall every year take part in joint manœuvres with the infantry, inasmuch as they can thus practice their service in reconnoitring and screening with reference to a real actual object, and in order that they may have as often as possible an opportunity of making an attack on infantry and artillery. Otherwise, owing to the constantly increasing cry as to the destructive effect of long range fire, there is some danger that the cavalry will learn to consider each and every attack on the other arms as impossible, and will simply endeavour to get out of the reach of fire as soon as either of them comes in sight. Let no one imagine that our Prussian pluck will save us from this. As the troops are taught in peace, so will they act in war, at least at first; and no one can deny the importance of the issue of the first battles in a war. It was the case that in former days the artillery were always ordered, at manœuvres, to retire as soon as they came under infantry fire; it thus became an accepted principle that they were to do so. For example, a battery once retired in war with the excuse that it was under infantry fire; as a matter of fact a sheep, which they meant to kill at their bivouac, had been shot by a stray infantry bullet. It was not until the last war that the artillery succeeded in getting over this prejudice.

Besides, at the manœuvres, the cavalry are often very hardly used by the umpires, however fortunate they may be in other respects. If each and every charge of cavalry on infantry is declared to be repulsed, if they

are always made to fall back whenever they simply hear the fire of infantry or artillery, even though no one knows whether this fire was aimed at them or not, in this case cavalry must learn to dislike to allow themselves to be seen. They therefore withdraw themselves far away from all combination with the infantry, and halt there, almost detached, doing nothing, until at length the presence of the hostile cavalry, which are out of humour for exactly the same reason, give them an opportunity of passing the time in objectless little cavalry fights.

Supposing that some cavalry have made a bold and well executed charge, perhaps over hedges and ditches, and have fallen in the closest possible order upon some infantry, and then find themselves put out of action, because they attacked unbroken infantry (and at the manœuvres, all infantry are naturally unbroken): have we any right to blame their leader if he loses all desire to charge infantry, since he will thus make himself ridiculous in the eyes of the on-lookers, and will, moreover, wound the proper pride of his men. For it is much worse, and more humiliating to a mounted than a dismounted body of men, to be put out of action, for the former have to dismount as a sign of their condition, while to be dismounted on the field of battle is held to be a form of punishment.

The umpire certainly finds himself in a difficult position, for if he declares that the cavalry charge has succeeded, he must allow that the infantry, upon whom the charge was directed, have been destroyed; while he must on no account lead the infantry to believe that they can be worsted, if they quietly and firmly await the charge, even though that charge be carried out in the best possible order. If he were to do so, he would instil into the infantry a dread of cavalry, which is quite baseless, and which might, in war, have the most disastrous results.

I have found that it is quite possible to escape from this dilemma, without injuring the pride of either of the two arms. Let the umpire, supposing a well-managed cavalry charge has been made on infantry who have received it well, say that either of the two arms would have been successful, if the other had belonged to any other army in the world; and let him then decide, according to what may best suit the general situation, that one of them (and which) is to retire, adding expressly that he only does this in order to separate the combatants; he may order this to take the form of a voluntary retreat, which is not to be followed up until the troops are again divided by their proper interval; in this manner, each arm will preserve its proper pride, and its desire for fresh action. Such a decision will also obviate the many detestable animosities, which often arise between commanders, and even between whole bodies of troops, when one of them has been the cause of the other being put out of action.

This "putting out of action" is generally at the manœuvres used with too much freedom, so that owing to it the pleasure in them, and any enjoyment of the training, as well as the independent action of the junior officers is very much diminished by its abuse. If every body of troops which has got into a difficult position, or has made an unsuccessful attack, is to be put out of action, their leaders will not willingly run any chance of impairing their reputation at the manœuvres, and will, therefore, acquire the habit of avoiding risk, while, on the contrary, they ought to accustom themselves to take a pleasure in all danger. This has especial force in the case of cavalry, when it is put out of action, for attacking intact infantry. How is it possible, at the distance

at which the decision as to the attack must be made, to see whether the enemy's infantry are intact or not? In war, an opinion can sometimes be formed on this question from the number of dead and wounded which may be seen to have fallen, from the loss of order, or from the quantity of fugitives. But it is not always possible to be certain on this point, and some most valuable moment might be lost, if one waited too long in order to make sure. But in peace there are no such signs, and it is quite impossible to know whether the umpire will, after the charge, consider the infantry to have been in disorder or intact. Moreover, the regulations themselves (para. 722, No. 2), lay down how infantry, which are not in disorder, are to be attacked by cavalry. But if the cavalry does charge, it is put out of action! Again, in war, the cavalry know, by the shell and bullets which fall among them, whether the enemy has observed them and is firing on them; but in peace they are doubtful whether the enemy is really firing on them, or on some totally different object, and may thus, in the latter case, be surprised by a charge. In manœuvres, "putting out of action," must be used as little as possible. Such a measure is a very severe punishment. It ought indeed not to be so, and the regulations for the manœuvres do not describe it as such. But as a matter of fact, it is a punishment, and is so considered by the troops. For infantry who are ordered to pile arms, or cavalry who are made to dismount, and to remain out of action for half-an-hour or an hour in this position, are distinctly punished in the presence of the other troops. I have always found that the manœuvres were much more instructive, and that the troops took much more pleasure in them, even when they were called upon to make great exertions, if "putting out of action" was used only exceptionally, as a punishment for indolence and want of attention, as, for example, when dismounted cavalry allowed themselves to be attacked by infantry, or when infantry or artillery on the march were fallen upon by cavalry, who received no fire as they advanced, &c.

It is also necessary that all commanders of infantry, down to officers commanding brigades, regiments, and battalions, should be annually exercised in conjunction with cavalry, not only with so many, or so few, as are told off to a division in war, but with the larger masses, in order that they may gather sound ideas as to the space and time in which cavalry move and form in the field, and as to the relation of the infantry to cavalry, whether they be their own or those of the enemy. All this may be calculated by arithmetic; but there is no time to work it out during a battle. Unless one has repeatedly seen how such masses move and form up in the field, it is impossible to acquire that sort of instinctive feeling, which tells one within what time they can or must be expected to arrive at such and such a spot.

The cavalry also can only learn by such practice, in close combination with the infantry, how they can efficiently assist the latter in action. It is true that the conditions of battle are very different from those which obtain during the manœuvres, but they have even less resemblance to mere theoretical speculations, and many matters with regard to which no resolution has been arrived at, and concerning which opinions still differ, may be decided by the mere appearance of the troops when they have been adapted to the ground. I remember how an officer commanding a cavalry brigade (one of our most renowned cavalry officers), was of the opinion that he could efficiently assist the infantry in battle, if he began his charge by pushing his brigade, in column of squadrons, through the intervals of the fighting infantry, and deployed them after passing through.

I gave him free opportunity at the next manœuvres, and simply sent him word, when the artillery and infantry contest was at its height, that this was the moment to charge.

Down came the brigade from the rear upon the fighting infantry, and wanted to be allowed to pass through. But owing to the infernal noise of the rapid fire, during which the infantry had eyes only for the enemy, they saw and heard nothing of what was going on behind them, and the cavalry, if they had persisted in breaking through, would have had to ride down part of their own infantry, who were at that point ensconced in shelter trenches. So they had to wheel away and gallop to a flank before they charged. The impossibility of breaking out through infantry in action became yet more obvious, when one imagined the ground in rear of this infantry to be perpetually swept by the enemy's fire which had passed over them, for which the cavalry would have served as a species of butt, and when one realised that in rear of such a fighting line of infantry there would be a constant movement of ammunition carts, of wounded being carried to the rear, of dressing stations, &c., all of which the cavalry brigade would have had to ride down. If during the whole of the Autumn manœuvres of that year the cavalry division of which I speak had learnt nothing more than this fact, that such a mass of cavalry (a brigade or a regiment), can efficiently assist fighting infantry in battle only on condition that they move round one of the flanks, so that the fire may produce its full effect before the cavalry close, then the latter would have obtained full recompense for having taken part in these exercises. But the infantry must also learn by such manœuvres what they are to do when such a charge is made by their own cavalry in their vicinity and within the sphere of their action. Who has not noticed, both at the manœuvres and in war, that the infantry, as soon as their cavalry charges, wait and watch them quietly, as if some one else was doing their work and they could afford to be idle. But is not that moment, when our cavalry closes and the enemy's fire is directed upon them, while our own infantry being masked cannot fire, just the most favourable opportunity possible for gaining ground at the command "rise! forward! hurrah!" and for rushing to the front up to our own cavalry, in order to aid them and to hold the ground which they have captured? But how seldom this is done! How often have I at the manœuvres been obliged with this object to ride personally forward into the ranks of the infantry, and to be myself the first to shout out this word of command, in order to give to the combat some resemblance to a combined action of the two arms.

Such combined action must however be made, by constant practice, a mere matter of course, if it is ever to take place in war.

I have already fully explained how useful to infantry in war, and even during a battle, are the cavalry specially attached to divisions, how no company likes to make a reconnaissance towards a farm, &c., without being accompanied by a couple of troopers as orderlies and patrols, and how, even in the middle of a battle, troopers are sent in all directions to obtain rapid information with regard to the ground, &c. I could give several other examples; how even at the storming of a village (Le Bourget), mounted patrols were sent over the open country in front of the infantry, in order to see whether this or that part of the village was held by the enemy or not; and how by the use of single scouts, who galloped boldly over open ground which was swept by the enemy's very heavy infantry fire, the fire of the artillery and of the skirmishers could be used in

combination at the proper moment with the very best result. But this would be to carry owls to Athens. For among us no one has ever denied the necessity of attaching a cavalry regiment, as an integral part, to an army-division, and there is no danger of our imitating the distribution which the French army used in 1870, when no divisional cavalry was given to the infantry divisions, but the whole of the cavalry of an army corps was collected into a brigade or division, which was placed directly under the general commanding the army.

Think of the matter how I may, I come always to the same conclusion. I would not alter anything in our present peace organization for the cavalry. But I consider that it is most desirable that all the cavalry should annually take part, not only in the exercises with the other arms (field manœuvres and the exercises of detachments of all arms), but also in the manœuvres of organised cavalry divisions.

19th Letter.

THE ACTION OF DISMOUNTED CAVALRY.

I HAVE up to the present said hardly anything concerning one point in cavalry tactics, about which, even in the cavalry itself, very varying notions and opinions have been expressed, and with regard to which I have up to now met with most indistinct ideas. I refer to the action of dismounted cavalry.

Cavalry have been called upon, even when engaged with the enemy's cavalry, to dismount a reserve of a few squadrons, with the object of occupying some defile in rear. In the last war we saw dismounted cavalry take villages (defended it is true only by Gardes Mobiles and Franc-tireurs), and there is even an oil painting of such an exploit. This instance has been elevated into a principle, and we hear important cavalry authorities saying, "we must be self-sufficing, and must free ourselves from all dependence on the infantry." They even go so far as to practice the cavalry at their manœuvres in building bridges, in order to make them independent of the bridging troops. I once saw a sketch of a regulation for the instruction of the cavalry in dismounted action, according to which the cavalry were to undergo the whole of the training of the infantry in minor tactics and field service (notoriously the most difficult of all); fortunately this draft never became a regulation.

According to the newspapers one of the most important of our neighbouring states has not only re-instituted dragoons as mounted infantry, but has made them the prevailing element in its cavalry. I found during my inspections some leaders of squadrons who, following the general tendency of the times, had practised dismounted action with especial zeal, and had borrowed the formations of the infantry regulations. When a part of the squadron had been dismounted for action, while the other half remained mounted, according to regulation, as a reserve, you saw a skirmishing line composed of dismounted hussars, followed by a dismounted support, and advancing at a run by rushes of one half at a time, while the other half fired. It was most imposing! For the half-squadron consisted of hardly 30 carbines, while of these ten formed the support, so that each rush was made by ten hussars. It is scarcely possible to believe in the success of such an attack.

On the other hand many old officers of cavalry suppressed this zeal for the instruction of cavalry in dismounted action, declining altogether to see it at inspections, and looked upon it with contempt, like the cuirassier in "Wallenstein's Camp," and as something unworthy of mounted troops. This dislike is not a mere prejudice. For a blow is given to the true spirit of cavalry, if a trooper once believes that he can fight without his horse. The close connection between horse and rider will thus be lessened, and the love of the man for his charger will be weakened.

The importance attributed in high places to the dismounted action of cavalry is proved by the fact that every cavalry soldier has been armed

with a long range carbine. But no rules have as yet been laid down as to the circumstances in which cavalry are to fight on foot. The regulations content themselves with stating the formations to be used, and say only a few words as to attack and defence. This step-motherly treatment of dismounted action in the regulations leads to the belief that no great importance is attributed to this exceptional kind of fighting, but on the other hand the silence which is preserved with regard to the conditions of its employment leaves a free field for the discussion of the subject.

Let us first consider the amount of strength which will be displayed by the cavalry in such dismounted action. A squadron will but very seldom commence a war with more than 60 files. As a rule it will possess a smaller strength of combatants. But let us say there are 60 files, and presume that every third man will be a horse-holder; there will then be at the most 80 carbines for the fight on foot. Taking for granted that a cavalry division of 6 regiments or 24 squadrons will have one regiment of cuirassiers, we may certainly suppose that the latter will remain mounted as a reserve. For even though the cuirassier regiment be armed with carbines, yet a cuirassier, with his long boots and his cuirass, crawling about on the ground would be such a parody on the active infantry soldier, that one would be glad to give up any idea of his efficiency in a dismounted fight, unless the most absolute necessity compelled him to make use of his fire-arm. In addition to the cuirassiers about two squadrons of light cavalry must remain mounted for the purpose of reconnoitring, and thus of the division, 18 squadrons at most (1440 men), can be employed in dismounted action. Now let us imagine these 1440 men used to carry out an attack on foot. In the first place no carbine however well it may be constructed, will shoot so far or so accurately as an infantry rifle, while moreover it is not possible to give so much time to the musketry instruction of the cavalry as to that of the infantry. The latter will thus always shoot farther and better than the former. From this we may without hesitation conclude, that a weak infantry battalion, of from 700 to 800 rifles, in a good defensive position, will hold its own, even in fire, against the attack of the dismounted skirmishers of a whole cavalry division. Now comes the moment when these skirmishers are, according to para. 236 of the regulations, to charge home. How are they to carry on their fight with cold steel? When officers commanding cavalry have asked me to lay down some system on which this might be carried out, I found myself very much puzzled; for up to this moment each man has held his carbine in his right hand, in order to fire with it, while his sword has been hooked up. If he now hooks up his carbine and draws his sword, the former, as it swings and hits his back, will hinder him as he runs, and at the same time is out of the way if it is necessary to fire at a very short range. Is he to throw away his carbine and get rid of it? That could never be allowed. The most natural thing for him to do, when it comes to hand-to-hand fighting, would be to reverse his carbine and use the stock as a club. But such a thing as this cannot be laid down by regulation. Under all circumstances a cavalry soldier fighting on foot with the "arme blanche" plays but a poor part as compared to an infantry soldier who has a bayonet on his rifle.

Let us look at this question with regard to the possible equipment of cartridges. We cannot count upon more than 20 cartridges per man. It is true that the general regulations prescribe (para. 234, No. 5) that "care must be taken with respect to punctual supply of ammunition," but it gives no directions as to how this is to be done. Could the ammunition

carts come up into the firing line during a musketry fight of this kind? Is not the supply of ammunition to an infantry firing line already an unsolved problem? Is it not possible in the case of the artillery only with the greatest difficulty and through an enormous amount of energy? Now an infantry soldier carries 80 cartridges, and has yet to be most frugal of them during the introductory combat, in order that he may not, at the most decisive moment of all, suffer a check owing to his want of ammunition. How soon would the 20 cartridges of the cavalry be expended? Can we burden the cavalry soldier with more cartridges? No! for how and where is he carry them? When we take all these circumstances into account, we shall still more clearly recognise the weakness of a fire-fight of dismounted cavalry; and I certainly am not saying too much when I declare, that 500 good infantry can oppose the dismounted troopers of an entire cavalry division with every prospect of success.

If therefore a cavalry division finds itself opposed by a weak battalion of the enemy which is posted in a good position, it would be better for it to make use of the advantage which it possesses in the speed of its horses, (*i.e.*, in its nature as cavalry), and to quickly pass round the flank of the position, in order to fall upon the rear of the infantry, while the artillery of the division fires upon the enemy's front.

The facts that I have stated are sufficient to prove that cavalry cannot allow themselves to carry out, by means of a musketry fight, an energetic offensive which must entail heavy loss. Such an offensive would be advisable for them only in the case where a very weak or morally worthless body of infantry (armed crowds, franc-tireurs, &c.) stood in their road and endeavoured to forbid their further advance.

The conditions of dismounted action for cavalry on the defensive are far more favourable, especially when they have had sufficient time to find cover. They produce their best effect by deceiving the enemy and by gaining time. For an advancing foe, who receives a fire of small-arms from an occupied village or from a defile, cannot at once make up his mind whether he has infantry or dismounted cavalry in his front. The head of his column halts, and his march is stopped. He reconnoitres, comes to the conclusion that it is not advisable to rush on without consideration, makes dispositions for a turning movement, and extends into the order of attack. By the time that all this is done the cavalry will perhaps have mounted and galloped off, and hours may elapse before the deceived enemy again resumes his order of march; hours which may have rendered possible decisive action at some other point, or which will at least have much fatigued the advancing enemy. Or it may happen that the enemy does not discover the deception, and considers the position which the cavalry holds to be too good and too strongly occupied by infantry, and therefore falls back and gives up all idea of attacking. In that case the cavalry remain in possession of the important point. I may mention, as examples, the two French squadrons commanded by Lieutenant-Colonel Dulac, which stopped the 13th division on the Kaninchenberg near Forbach, on the 6th of August, 1870, and the dragoons of the Guard at Dieulouard, who, hiding like skirmishers in the vineyards, made the enemy's infantry, who had been brought up by rail to occupy this important defile, believe that our infantry had already seized it, with the result that they, without any serious attempt at attack, got into the train again and went off. If the cavalry are assisted by horse artillery the deception may be made yet more lasting and complete, as indeed was the case at Dieulouard.

But we can neither expect or demand more than this from the action of dismounted cavalry.

It can moreover never make cavalry entirely independent. Cavalry can be made independent by it only when employed against detachments of the enemy's infantry who have quite lost all order, against unorganised but armed mobs or against hostilely disposed inhabitants of a country. But cavalry when on the defensive can by their dismounted action, and by deceiving the enemy, under certain circumstances retain far superior masses of the enemy long enough to prevent them from arriving in time at any decisive point, while they may, if sent on ahead at a rapid pace, obtain early possession of important points, with the object of holding them until their own infantry can come up and occupy them.

The exercises of cavalry in dismounted action must therefore be limited chiefly to a skilful occupation of localities and positions, and to practice on the ranges.

It would be very dangerous indeed to expect or to ask more from them. For if more were demanded from them in peace, if, for example, they were called upon to learn the whole duty of infantry in minor war, it would be necessary to employ in this training the greater part of the time allotted to drills and instruction. But every cavalry officer knows that the cavalry have now no time to spare, and that every officer commanding a squadron has to carefully divide and skilfully use the time allowed for exercises, day by day and hour by hour, if he desires to satisfactorily meet the demands which are made upon that arm in the present day. He knows also how physically tired every trooper is daily in time of peace owing to the duty which he is now called upon to perform, and that it is impossible to make still greater demands upon his bodily strength, by working him at extensions into skirmishing lines, advancing by rushes in swarms, and all the other exercises which form part of the minor war of infantry. If such a training be demanded from the cavalry, they must give up some other portions of their exercises, and the excellence of their instruction as cavalry must thus in some manner deteriorate. This is the special reason for the dislike which so many old cavalry officers feel for dismounted action, dislike so bitter that I have heard it described as "a silly joke and a dangerous folly."

But if more be demanded in war from dismounted cavalry than that which I have shown to be the limit of their efficiency in action, there will be great risk of their employment on secondary objects, and of a too lavish use of this valuable arm. Imagine a case where the 1440 dismounted troopers of a cavalry division are expected to storm a village, which is fully occupied by a well trained and resolute battalion of from 500 to 800 rifles. If the battalion fights skilfully and stoutly, one of two things will happen; either the cavalry, after severe losses which may easily amount to the strength of an entire brigade, will arrive at the conclusion that they cannot drive out the battalion; or fortune will favour their attack, but they will lose in the fire-fight, and yet more in the combat with the "*arme blanche*" which will follow it, so many of their troopers, that they will have little more left than the six squadrons which have remained mounted. Is the game worth the candle? Certainly not.

It is still more dangerous to expect more from the cavalry than the nature of the arm will permit it to give when fighting on foot. For certain combinations may very probably be founded upon such expectations, but will, when these are not fulfilled, fall to pieces like a house founded on sand, and entail the loss of a campaign.

It shows an entire misapprehension of the nature of cavalry to require that they shall be self-sufficing and entirely independent. To think so is a mere Utopian fancy.

The infantry is, and will always be, "the army." Cavalry is, and will always be, merely an auxiliary arm to the infantry. Cavalry cannot attain to its highest and most valuable efficiency, or win its highest honour, unless it constantly remains convinced that it exists only for the infantry, and that it should work only for it; and this whether as cavalry divisions under the direct command of the commander-in-chief, or as divisional cavalry, or as a patrol in close connection with a small infantry picquet. We must always therefore remember, when using cavalry, that it can never be entirely self-sufficing, but must always need a closer or more distinct support from the infantry, as well as sooner or later its direct assistance; it will otherwise be sacrificed without an object, while the infantry will find itself deprived of its most valuable aid.

We can therefore, in my opinion, quietly look on while our great neighbours make the whole or the greater part of their cavalry into mounted infantry. This new creation will, like all hybrids, be of little use, and will fail entirely to discharge the most essential duties of a good cavalry.

20th Letter.

CONCERNING THE POSTING OF HORSE ARTILLERY TO THE
CAVALRY DIVISION.

WHEN I finished my last letter, I thought that I had spoken about pretty well everything that I could have to mention with regard to cavalry. But you notice that I have hardly said anything concerning the question of attaching horse artillery to the cavalry division. I omitted it, because the subject of the use of horse artillery in combination with the cavalry division has more to do with a discussion concerning artillery. But if you wish to know my opinion with regard to the amount of horse artillery which should be attached to a cavalry division, I must continue to you my remarks upon cavalry.

In the last war the posting of horse artillery to the cavalry divisions was carried out on very varying principles. We find cavalry divisions of 24 squadrons with 18 guns (the Guard), cavalry divisions of 36 squadrons with 12 guns (the 5th), others of 24 squadrons with 12 guns (the 2nd and 4th), one of 20 squadrons with 6 guns (the 6th), two of 16 squadrons with 6 guns (the 3rd and 12th), and one of 24 squadrons with 6 guns (the 1st). Moreover in the Baden, Wurttemberg and Bavarian contingents there were cavalry brigades, which were not formed in divisions, and which each had 6 guns, but had no artillery permanently told off to them.

According to an old theory 3 or 4 guns of horse artillery ought to be attached to each 1000 troopers. This estimate has no practical foundation, and was settled only in accordance with the proportions which then existed.

The regulations leave this an open question, but take into consideration the possibility that a single battery of horse artillery might be attached to a cavalry division. This is shown by the words (para. 224, No. 2), "if more than one battery is told off to the division, &c."

In order to form an exact idea on this point, we must consider the action and the use of a cavalry division. In all the rules which they lay down concerning the employment of a cavalry division, the regulations take into account only one object of attack. The horse artillery must fire on this object before the charge takes place, and it will find sufficient time for this purpose, if it takes up a position as soon as the enemy is in sight; this will give it at least so much time as the cavalry division needs to deploy from the order of march and to form itself in three lines for attack. If when this has been done the moment for attack does not seem to have yet arrived, the horse artillery will have yet more time to prepare the charge by its fire. When there is only one object of attack, it would appear that there can be but one target for the horse artillery of the cavalry division, since it ought not, as a rule, to allow itself to pay any attention to other things, as, for example, to an engagement with the

enemy's artillery. Thus para. 224, Nos. 3 and 4, of the regulations speaks of the selection of but one position by the artillery.

This seems almost sufficient if only one battery of horse artillery is given to a cavalry division.

But the division does not always show itself at one point only. It often happens, especially when reconnoitring or when veiling their own army, that single brigades are widely detached on independent missions. It may thus come about that the battery would be only an incumbrance to a light cavalry brigade, and might impede its movements, if, for example, it was ordered merely to observe; in this case it might have to disperse altogether and under certain circumstances to rapidly disappear; no battery would then be attached to it. Thus up to the 13th of August the Guard corps sent out the dragoon brigade to the front without any artillery. But if it becomes necessary for a brigade to occupy and to hold a certain point, it must then have artillery. For example, the Guard corps sent forward a battery of horse artillery to the dragoon brigade on the 13th of August, since it had to seize and to hold the important point Dieulouard with its bridge over the Moselle. It may also happen that each brigade of the cavalry division has a special task to fulfil, and has thus to move by a separate road (as was the case with the cavalry division of the Guard on the 16th and 17th of August); I think however that such an employment will be exceptional and must not be considered as normal, while I think it better to use one brigade on each of two roads, and to keep the third in rear of the centre as a reserve. From what has been said above I consider it necessary to have as many batteries with the division as there are brigades, for I sincerely hope that no one will ever again suggest the breaking up of a battery and the employment of horse artillery by divisions.

Again if we go into the detail of the use of horse artillery in combination with cavalry, we shall find that it is most desirable to tell off more than one battery to a division. Imagine the situation of an officer commanding a battery, who finds himself attached with his battery alone for an entire campaign to a cavalry division. No body of troops requires so absolutely as the artillery the continual presence of its captain, whether it be on the march, in quarters, or in action. The many-sided character of the arm, including as it does, horses, men, carriages, guns, and ammunition, necessitates the continual supervision of an experienced leader, since the senior lieutenant is generally too young to have sufficient experience and trustworthiness in all these matters. Everyone must have noticed how quickly disorder sets in, when the well-known and much-feared voice of the captain is no longer heard. Everyone also knows by experience how the fire-discipline falls off in a battery, and how the fire soon becomes an irregular, badly aimed and uncontrollable, "*feu à volonté*" (which it is impossible to correct, and which therefore has no effect), as soon as the men cease to receive decided corrections from the lips of their observant leader. This springs from no want of discipline, but from an intense desire to assist the lieutenant, who, in the opinion of the N.C. officers and Nos. 1, has not had sufficient practice in observing fire; they therefore correct their laying according to their own opinions, in spite of the word of command of the young officer, and thus puzzle him terribly, for he does not know what to trust to.

But though the officer commanding a battery is unwilling to leave his battery even for a second, yet in order that horse artillery may be properly used in combination with a cavalry division his place ought to be

at the side of the officer commanding the division. Let us consider, for example, a division on the march. The officer commanding the division is informed by his patrols that they are in contact with the enemy; he rides forward to some hill, looks around and makes up his mind. Is he now, while he is making his dispositions with regard to his brigades, to send his orders to the battery by a special galloper? To do so would be to place a captain's command upon the same footing as that of a brigadier. This must in the long run lead to trouble, and could be done only as an exception. As a rule then the horse artillery will receive its orders too late, and will not produce its full effect. The commander of the artillery must therefore ride with the commander of the division; if he does so he knows all that the latter knows, he hears his decision as to what is to be done as soon as it is made, and immediately leads his artillery to that point, whence it can the most efficiently aid the attack; and this even before any orders are given to the brigades. The position of the artillery will generally be on the hill where the divisional commander stands for the purpose of reconnoitring.

The officer commanding a single battery attached to a cavalry division will thus have to be in two places at once, for he must never leave either his battery or the divisional commander. But if the artillery be of the strength of a brigade, then the working of that arm will be far easier, since even though the officer commanding rides with the general, yet he has an adjutant. He will send this adjutant to call up the artillery, but will remain himself near the divisional commander; he will thus hear all special orders concerning the cavalry, and will be able as he stands upon the hill to acquaint himself with the position of the enemy, the character of the ground, the range, &c., and will so be in a position to at once inform the batteries as they arrive of everything which it is necessary that they should know. I hope that no one will raise an objection to this on the ground that, on the one hand, the officer commanding the brigade must equally be in two places at once, since he is needed both with his batteries and with the divisional commander, and on the other that the officer commanding a battery which is attached to a cavalry brigade is in the same position as has been above described, and will equally require a colonel over him. For it is much easier for the officer commanding a brigade to leave his troops than it is for the officer commanding a battery. Even in peace at the manœuvres he very rarely directs his whole brigade by word of command or by trumpet call. In war he always *sends* his orders. He even sends directions regarding the fire by gallopers. The regulations certainly lay down that he is to join his batteries in order to direct the fire. Even if he does so he will seldom be far from the divisional commander, since the height giving a good view, upon which the batteries will come into action, will generally be the place from which also the general will send his orders to his cavalry brigades. Thus the artillery commander will not be separated from the latter until he personally leads forward his third line to the charge. It is in that case most essential that there should be an officer commanding artillery present, whose attention has not been absorbed during the whole time that the guns have been in action with the details of the direction of the fire, but who has had time to learn the intentions of the divisional commander, before the latter rushed on with his third line into the mêlée.

The question is entirely different with regard to a battery which has been attached to a cavalry brigade, for the connection between these

units is not a matter of organization, or permanent; it is rather a temporary and exceptional link. Under such exceptional circumstances great difficulties will always arise, which cannot be met by any arrangements of organization.

If we consider the case of a cavalry division, which has to act independently some days march in front of the army, we shall recognise that it must have a strong and efficient artillery, if it is to force its way on in all directions. Three batteries will be quite the minimum which it will require, since should it meet with cavalry of the enemy who can bring a superior force of horse artillery into action, it will not be able to advance anywhere.

Reasons connected with internal administration have also much force against breaking up the brigade of artillery. Owing to new arrangements in organization the system of command in the artillery is based, since the last war, more on the brigade than it was formerly, more especially since each brigade has been provided with a paymaster and with an administrative staff. The brigade is the unit for mobilization, and has its own treasure chest. A battery which is torn away from its brigade for the entire duration of a war is thus placed in a position as uncomfortable as would be that of a company or a squadron which was separated from its regiment for the whole of a campaign. Moreover the divisional commander will hand over to his artillery the entire charge of the supply of ammunition, even of that for the small-arms. Is then the officer commanding a battery to be responsible, without a paymaster, for all matters connected with the pay and the care of his troops; is he to carry on the whole of the correspondence with respect to the supply of ammunition, horses, men, equipment and clothing; and all this without the necessary circulars and general orders, and without any staff of clerks or skilled accountants? He will have no office, just as the brigade had none before it received a paymaster, and may thus, since the control does and must work among us with the greatest exactness, be simply ruined by the non-observance of regulations of which he knows nothing. The anxiety which will spring from this fact will demand the whole of his time in quarters and on the days of rest, and will take off his attention from his battery. No one ever thinks of taking a company or a squadron, in the infantry or cavalry, from its regiment at the moment of mobilization. Most infantry divisions pass as a whole from the peace to the war footing; a similar organization is demanded for the cavalry divisions; and yet the artillery is to be broken up into its smallest units! We need not wonder that the artillery is not always correctly employed, when we see a battery taken away from its brigade from the moment of mobilization up to the end of the war.

But I think the system of granting honours is yet more important; and this is opposed to the breaking up of the brigade. I refer to the recognition of service performed before the enemy, by means of orders and marks of honour, and by the reports of distinguished conduct which are made after the war to the officers who command the troops in peace. There are certainly some soldiers of such philosophical minds, that they demand that officers and soldiers shall do their work and risk their lives without any consideration of any other reward than the joyous consciousness of having done their duty. But in no nation will the majority of soldiers be able to attain to this point of absolutely pure zeal for duty. With us, since the state is not wealthy enough to reward the soldier with money and goods for having risked his life in the service of his king and father-

land, the soldier fights for honour only, and of this there must be some outward signs, such as orders and decorations. How is a single battery, if detached as above mentioned, to receive any decorations, since it has no senior commanding officer to represent its claims? Sometimes it does very well, even better than its comrades in the cavalry; but sometimes it gets nothing at all. But if the batteries have a representative, who is always near the divisional commander and looks after their interest, it is his business to see that their services are recognised; while if the worst comes to the worst he can always appeal to the superior officers of his own arm to obtain for them anything in reason.

I may sum up my opinion with regard to the posting of horse artillery to the cavalry divisions, by saying that I think that a complete brigade of horse artillery ought to be attached to every independent cavalry division, which is intended to work under the direct orders of the commander of the army, and to be released from all control of any corps commander; and that this brigade should be formed exactly as it, at the mobilization, passes from peace to war footing, that is to say in our case of three batteries, no matter whether the cavalry division consists of 20, 24, or 36 squadrons, or whether it is divided into two or three brigades.

Very weak cavalry divisions of only 16 squadrons (XII. army-corps), will certainly not be made independent of the corps command. In this case it would be best not to give them any horse artillery as a part of their organization, but only in case of need or under special circumstances to hand over a battery or a whole brigade from the corps artillery, for some action or for some one day, to the cavalry division.

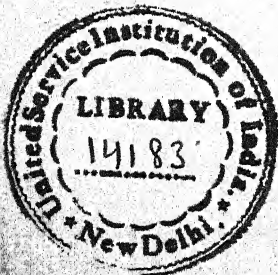
This mode of proceeding has also the great advantage that the horse artillery, when thus used, are practically of double use. The batteries remain as a rule with the corps artillery. If the cavalry division is sent forward, they are attached to it. If a battle takes place, during which the cavalry division is held in reserve, then the horse artillery becomes again a part of the corps artillery, and considerably augments its fire.

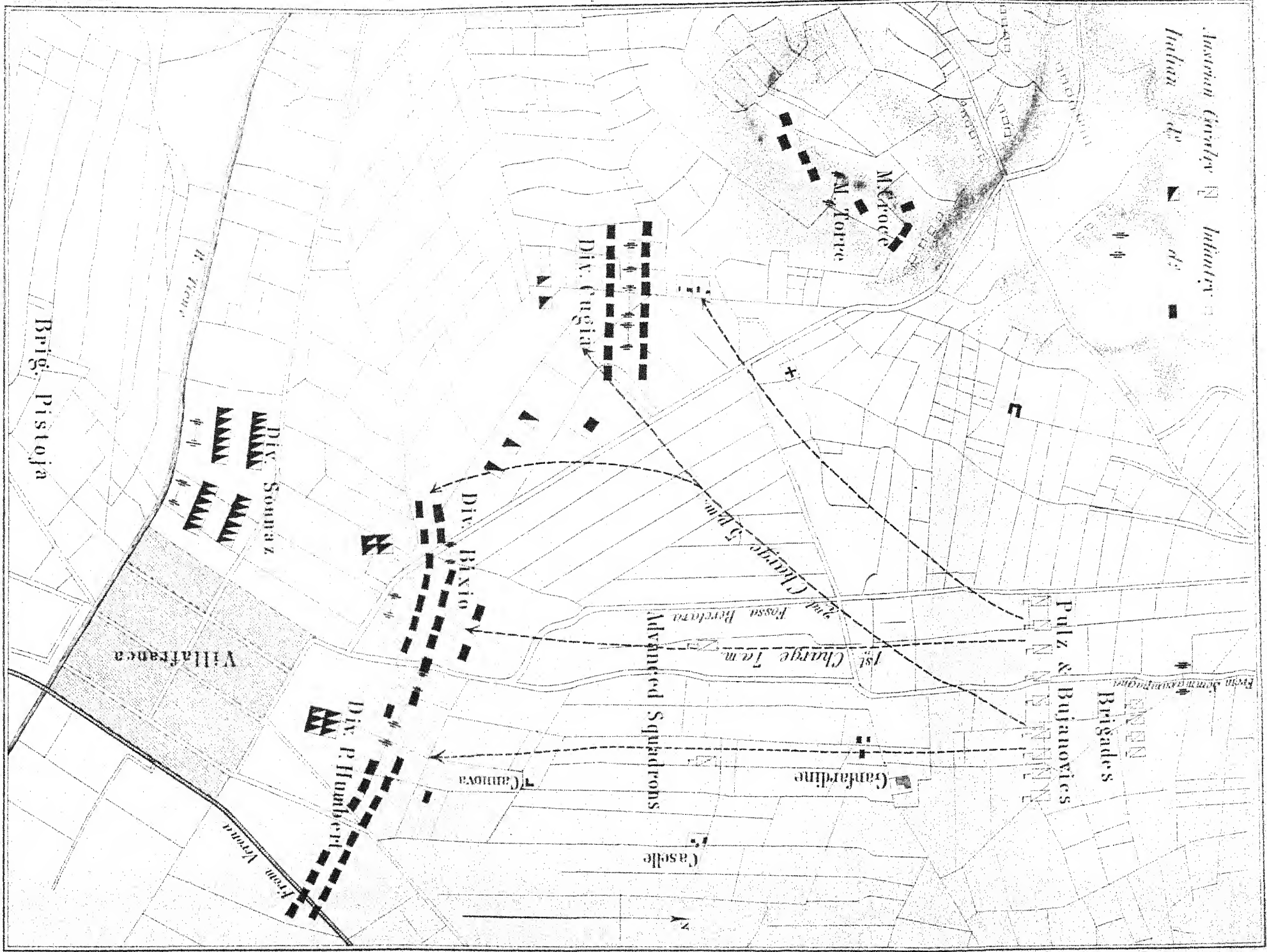
The horse artillery of the Guard corps was thus employed in 1870. The "*ordre de bataille*" originally told it off to the cavalry division. But the corps commander kept it at first with the corps artillery. When the cavalry division was called upon to act at a distance, the brigade of horse artillery was attached to it; but as soon as a battle took place, we saw the whole of the brigade fighting in the line of the corps artillery, which was thus augmented by 7 batteries or 42 guns, and thus, at St. Privat, Sedan, and Le Bourget, swayed the balance of victory.

For a cavalry division which takes part in a great battle does not require any horse artillery. It is held at first in reserve. If it is called upon to attack, it is obliged to make use of an opportunity of charging broken troops of the enemy. There is thus no need to break up its enemy with artillery fire, and there is besides no time to do so. The horse artillery of the cavalry division will therefore act as an idle spectator, unless it has already taken its share with the other batteries in breaking up the enemy.

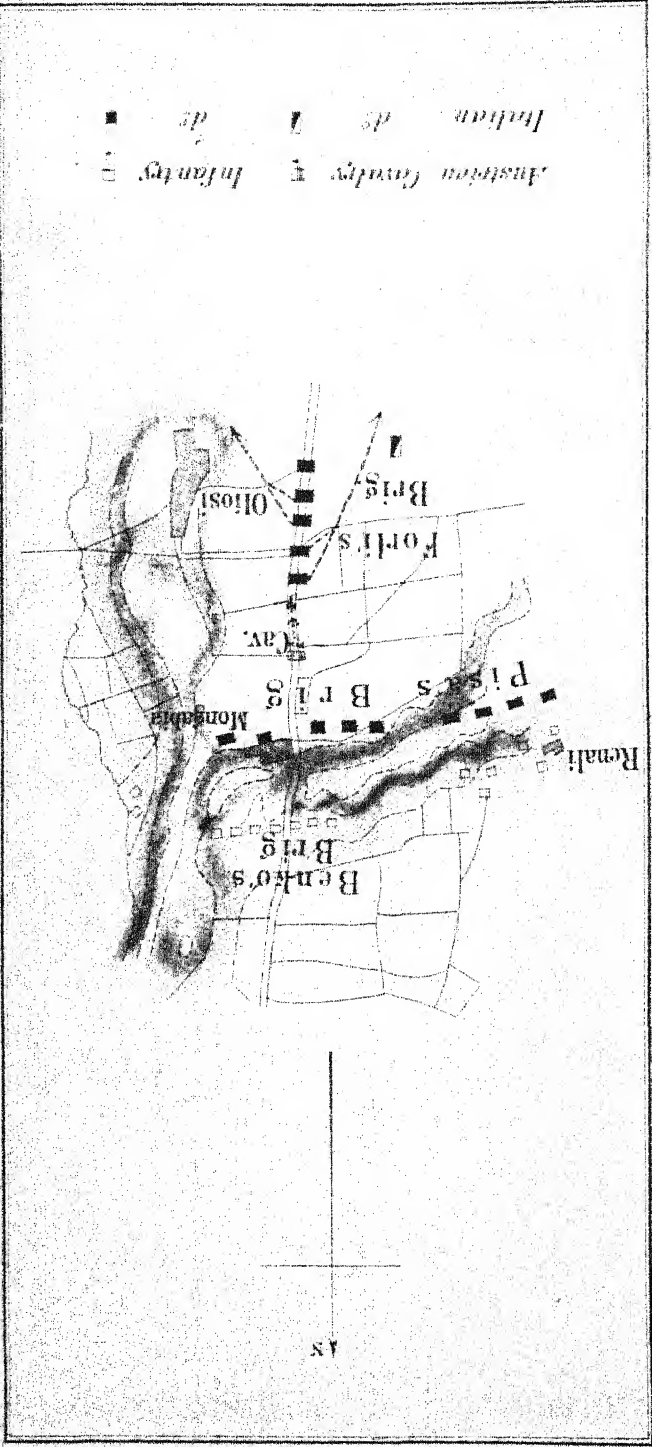
I can moreover find nothing to say in favour of telling off only two horse artillery batteries under a colonel to a cavalry division. These two batteries must always have left the third ones somewhere in rear, and this will have to play the miserable part of a mere appendage, and will be a sheep without a shepherd.

If then a cavalry division is very weak, say only 20 squadrons, like the 6th, in 1870, it stills seems better to tell off to it a whole brigade of three batteries, and thus to endow it somewhat too richly, rather than to break up the familiar brigade command, and thus to injure the efficiency of the troops.





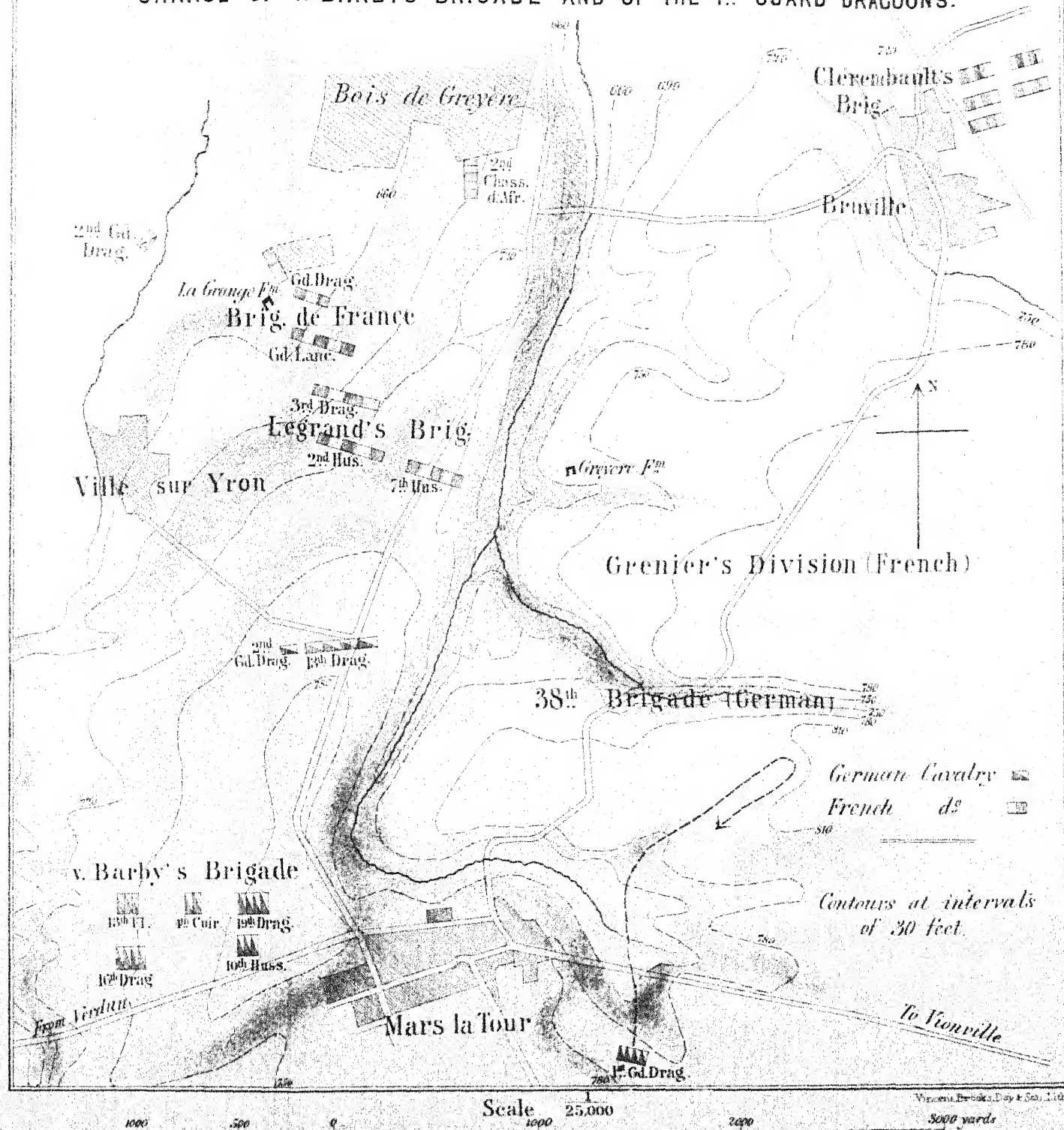
CAVALRY ENGAGEMENT AT THE BATTLE OF CUSTOZZA.
24 June 1866.



CHARGE OF THE ULANS AT CUSTOZZA.



CAVALRY ACTION.—BATTLE OF VIONVILLE. August 16th 1870.

CHARGE OF V. BARBY'S BRIGADE AND OF THE 1ST GUARD DRAGOONS.



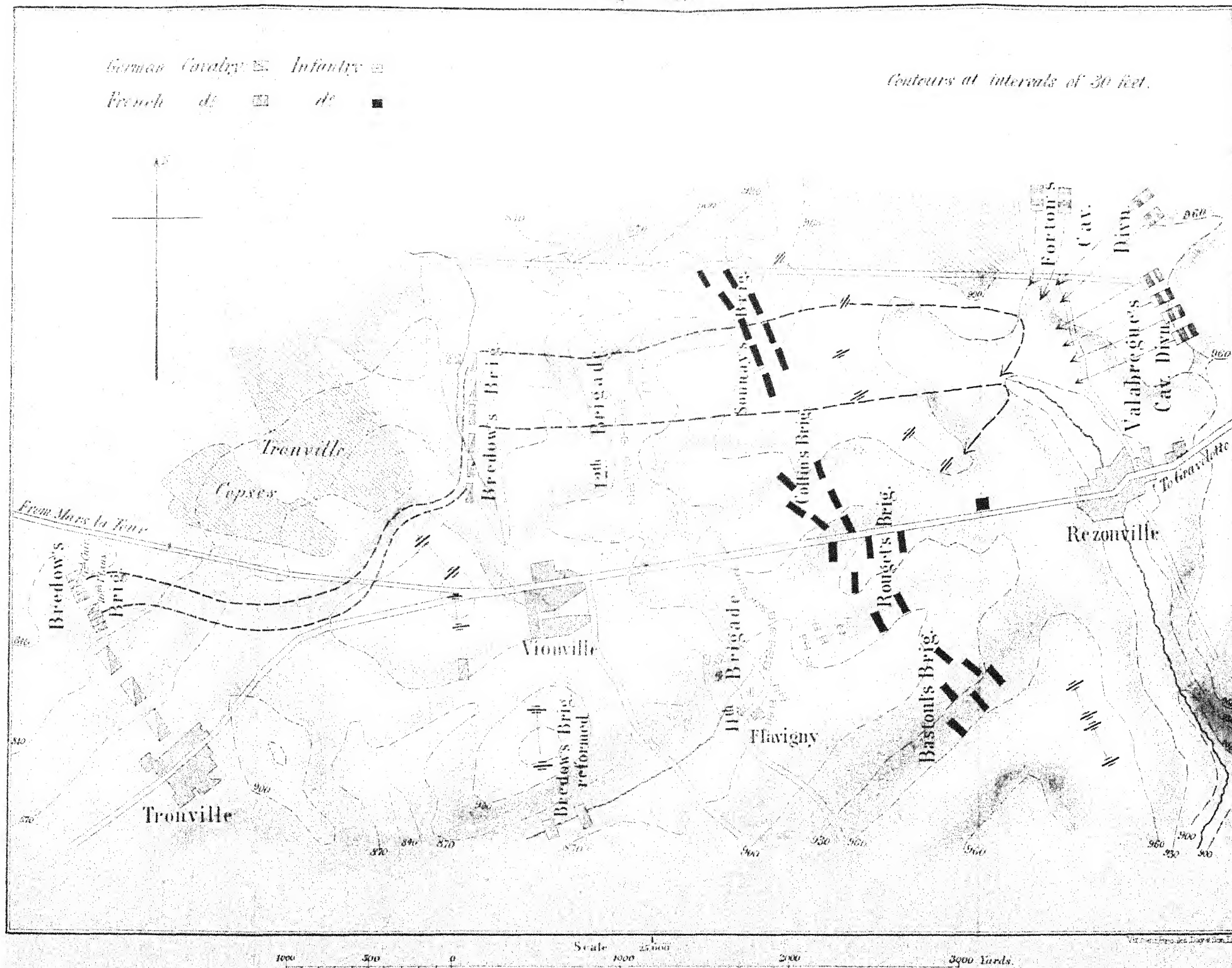
CHARGE OF BREDOW'S BRIGADE. BATTLE OF VIONVILLE.


16th August 1870.

German Cavalry:  Infantry: 

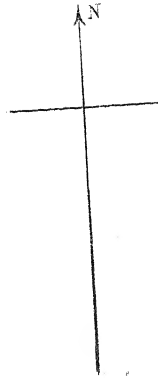
French *dit*:  *dit*: 

Contours at intervals of 30 feet.



German Cavalry 

French de 



From Mars la Tour

Bredow's

17th Cuir

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Cops

NOTES:

BY VARIOUS HANDS.

TO THE SECRETARY, R.A. INSTITUTION,

WOOLWICH,

30th August, 1888.

DEAR SIR,

I should esteem it a very great favour if you would obtain the sanction of the Committee for the publication of this letter in the Notes which accompany the Monthly Proceedings of the Royal Artillery Institution.

By this means I desire to offer my most sincere and grateful thanks to my many kind friends of the Royal Artillery in all parts of the world, who have on my retirement from the Regiment presented me with a handsome Testimonial piece of Plate and a substantial sum of money as well. The former will always be treasured by me and my family as our most valued possession, and as I am devoting the latter towards setting up house in civil life, the kindness of my friends will always be present to my mind.

Believe me,

Yours sincerely,

GEO. DANN,

Captain and Riding Master,

late R.H.A.

EXTRACT FROM A LETTER OF MAJOR-GENERAL P. H. SANDILANDS :—

On the 12th of last month I had a very interesting trip with Major Hunter of the Bombay Staff Corps, who was in the Regiment—a brother of Hunter, who was about your standing, and lately Garrison Instructor in India. We accompanied two Swiss Mountain Batteries in their march over the Sanetsch Pass, between Gsteig in Canton Bern and Sion in Canton Valais.

You know, that except recruits, the annual training of the Swiss army is only about a fortnight or three weeks. They have only two Mountain Batteries, one belonging to the Canton Valais with mules, and the other to the Canton Grisons with horses. Every second year they have a march over some of the higher Passes. They were first about a fortnight at Thun, and then they had a 7 days' march by Adelboden, Leuk, and Gsteig to Sion. I joined them at Gsteig, and we introduced ourselves to the Colonel-Brigadier, who was going to inspect them, watch their practice on the top of the mountain, and in fact take stock of them all round. He and all the officers were most polite, showing us round the batteries, &c. We saw the animals first in the road, as they were at evening stables—they had about 70 to each battery, all in extremely good condition, and no signs of rubs or galls of any sort; of course these animals are in constant employment as pack animals. Both mules and horses stand about 15 hands, the latter showing a great deal of blood, small heads, and good clean legs; but what struck Hunter

most of all, was to see how quiet and gentle they are when crowded together, no fighting or kicking. The guns are breech-loaders, steel, Krupp's; the B.L. arrangement being a Swiss pattern, weight about 220 lbs.—three animals to each gun and carriage. A subaltern to each Division, besides, they had Medical and Veterinary officers with each Battery.

They billet the batteries on the inhabitants for shelter and beds only—the food being provided by the Quarter-Master, *i.e.* Commissariat, bought in advance on the spot or sent on, and some carried; the oats and hay are also carried, the inhabitants being only obliged to provide straw, without payment, retaining the manure in exchange. The men got American tinned beef the day I saw them—1 lb. of meat, 1 lb. of bread and a pint of wine being, I believe, the ration, together with pepper, salt and vegetables. I tasted their soup, which was very good; but then, they know how to make soup out of nothing, adding nettles and other herbs which are common on the road side.

The advantage of being able to carry food for men and horses is, that though we started at 4 a.m., and they would not reach Sion till 7 or 8 p.m.—a march of 26 miles with an ascent of 3440 feet, and a descent of 5640 feet to Sion—they all came along in good form.

This is the first time I had seen a Mountain Battery, but you, doubtless, have seen them, and know how such a long string of animals in single file take time to mount up a narrow path, so that it was 10 a.m. before we got to the second plateau in the dreary Kreuzboden valley, where we were surrounded by rocks and the peaks of the Sanelhorn, Arbelhorn, Spitzhorn, &c., rising 2000 feet above us. Here we waited a little while before commencing to cross the snow. I cannot say patches of snow, because it was here and there we got patches of ground, and we had about $1\frac{1}{2}$ miles of this snow, the animals constantly having to be unloaded, and even then breaking through in consequence of the sun having begun to thaw the crust. The loading, &c., was very easily done, and the animals got through, one man leading and another holding on to his tail to prevent him plunging forward too fast in the deep places. The snow did not bind in the least, so that the animals in front did not improve the path for those behind. We passed quite close to the Zaufleuron Glacier at the base of the Oldenhorn, and from the top had a lovely view of the Valaisian Alps and Glaciers, with the Matterhorn and other peaks in their midst.

On the Pass they had some practice at targets placed on some rocks opposite, at ranges of 1800 to 2400 yards, and I saw them all carried away before I left, I could not wait to see them finish. We might take a pattern from their targets, which are made of paper on light lathes; they had targets about 5 or 6 feet square, and also some figures of foot soldiers on either side; these had been sent up on a couple of mules in advance. In addition to the batteries, they had some of the Signalling Corps out, with whom they set up a communication the previous evening; they had come up from Sion and established a post above Gsteig, so they had full information about the state of the Pass, &c. It was very curious to hear the words of command given in German as well as French. The men worked most quietly and willingly. I did not envy them wading the stream several times not far from the Glacier, which they were obliged to do to avoid the deep snow. I tried to find out which they prefer, mules or horses; a Brigade Major preferred the latter, but I think it very much depends which Canton they come from, as mules are the beast of burden of the Valais and horses of the Grisons. To me, after such a *very slight* acquaintance, I preferred the mules; they were quite cool when they arrived at the top, and they say can go longer without food; the horses seemed to have fretted more, but then the horse battery was in rear, and I dare say had more checks, as in one or two places the path had to be cut through snow drifts 5 or 6 feet high. I do not

know I need try and remark on ammunition, &c., as I did not examine it very closely, not wishing to appear too inquisitive, but it appeared much like ours. Common and shrapnel, with time and percussion fuze; the time fuze can be re-adjusted after it is placed in the shell. They have no range-finders, and I do not think it is any loss. The men all carried their packs, and worked in them, digging at the snow. I forgot to say that the signalling apparatus and system is, I think, that invented and proposed with us by W. L. Yonge (who was once at the Horse Guards). This will be joy to him, if he knows it. I asked them whether they did not like flags best as more portable, but they say, "No—not in the mountains," where it is sometimes very difficult to distinguish the signal station, and where distances may be great. They make the other station repeat each letter or signal before sending another. I forgot to say, going down hill, the guns are run down by hand, and the animals lead.

Now I must come to the end of my yarn, but thought I must not go through the place without noting what might be useful, though *we* are not likely to be at war with Switzerland.

"LAYING AT AN INVISIBLE OBJECT."

(See R. A. I. "PROCEEDINGS," No. 6, Vol. XVI.)

BY

MAJOR J. D. DOUGLAS, R.A.

At the end of the abovementioned article, Lieut. Horne says:—

"Whether Field Artillery is ever likely to be able with advantage to take up such a position as the one under discussion is, I think, an open question."

Agreeing as I do with the general proposition that the reverse slope of a hill is for many reasons not to be deliberately chosen as a position, I can give what I consider a fairly typical example of a position being forced on Artillery where no good view of the object is attainable. It is taken from the practice ground. Last cold weather, at Kirkee, five batteries were manœuvred in line for Service practice. The necessity, for safety's sake, of keeping all guns approximately in line while firing, and of working within a comparatively narrow parallelogram, forced the batteries to be, as they would in a European war, fire units and not, as they usually are in small wars, units of manœuvre. In two instances which came under my observation, a portion of the line got so far into difficulties that the guns could not be placed (without danger to the detachments) so that a view could be obtained from them of the target. In the first instance, three guns of one battery got into a dip. They continued firing and made as good practice as the rest of the battery. The circumstance was taken as a matter of course, and I do not know whether it was even observed by the Officer Commanding the (Brigade) Division. In the second instance a whole battery was similarly placed. It did not open fire from its original position, but limbered up and moved to a flank. I was not in a position to judge whether the undulation in front of it was sufficient to stop its projectiles or not.

II.

Lieut. Horne's article deals exhaustively and well with the system of drill for a single gun. I am rather disposed to think that many officers and N.-C. officers

ROYAL ARTILLERY v. HARLEQUINS.

9TH AND 10TH JULY.

HARLEQUINS.

<i>1st Innings</i>		<i>2nd Innings.</i>	
Mr. A. J. Webbe, st Cooper, b Barton...	107	c Haggard, b King	20
Mr. J. G. Walker, c and b Wheble	44	b Wheble	33
Mr. H. F. Hewett, b Curteis...	6	b Curteis	56
Mr. W. E. W. Collins, b Barton	18	run out	3
Mr. A. H. J. Cochrane, lbw., b King	3	not out	38
Mr. W. Foord-Kelcey, c Pratt, b Wheble ...	16		
Mr. E. Money-Wigram, b King	5		
Mr. A. W. Moon, c King, b Wheble	4		
Capt. J. Frederick, b Wheble	0		
Mr. R. J. McNeill, not out	2		
Mr. H. L. Jenkinson, c Pratt, b King...	0	not out	0
Byes, 2; leg byes, 1; wide, 2; no ball, 2	7	Byes, 11; leg byes, 2; wide, 1...	14
Total	212	Total	164

ROYAL ARTILLERY.

Major Anstruther, b Cochrane	0
Mr. H. R. Adair, b Money-Wigram	5
Bombr. Barton, c and b Money-Wigram	3
Mr. J. Haggard, b Webbe	87
Mr. C. D. King, c Walker, b Webbe	65
Capt. Wheble, b Cochrane	3
Capt. Curteis, b Webbe	11
Capt. Hall, b Cochrane	7
Maj. Stephenson, c Cochrane, b Webbe	11
Mr. E. S. Cooper, not out	5
Capt. Pratt, b Cochrane	0
Byes, 14; leg byes, 4	18
Total	215

THE
 “SPIRIT OF TACTICAL OPERATIONS
 OF TO-DAY.”

(PUBLISHED BY PERMISSION OF THE ALDERSHOT MILITARY SOCIETY.)

A LECTURE BY

COLONEL LONSDALE HALE, LATE R.E.

IN compliance with the very complimentary invitation given me by the Committee of your Society, I am come to lecture here this afternoon. The choice of a subject was kindly left to myself, and I have chosen “The Spirit of Tactical Operations of To-day.” I have selected it because it is a matter of vital and practical importance to the army, and moreover, one, the importance of which is not, I think, fully recognized in our service. It may, perhaps, seem presumption, amounting almost to what schoolboys would call “a piece of cheek,” for a retired officer of Engineers to venture to speak at this great camp of practical instruction on Tactical Operations. So it might be did I purpose to put forward this evening original ideas of my own, but I am not going to do so, for the simple reason that I am not sure that on Tactical Operations I have any original ideas of any kind whatever. My work for years has been the literary study of tactics, aided by many and repeated visits to battle fields, and this has naturally led to my having in my own mind certain views and ideas of tactics which I cannot now trace to their original source, but to-night, at all events, you will hear little of my own—a good deal of those of other people.

And who are those other people? They are chiefly the soldiers of continental armies. Not of our own, for it is abroad, not at home, that the most valuable lessons—the best teaching in regular warfare is to be sought. I trust that in saying this I am not injuring the *amour propre* or the spirit of patriotism of those who hear me. There is much analogy between conduct in public and in private life. At the present time I live in a singularly peaceful and quiet locality. Every night I lock the front door and the back door; the locks are not particularly strong, and I see that the shutters are closed, wherever there are any; and there are not many; and then I go to bed and sleep calmly with all the security of an infant. But if a gang of burglars came and settled in the neighbourhood, I should take other precautions. These I might evolve from my own inner consciousness, or I might consult

my neighbours on the matter. I don't think I should adopt either course ; I should go to my old friend, Sir Charles Warren, and obtaining from him the protection and guidance of a constable, I should proceed to the most burglarious district of the metropolis, interview a few of the householders, and in a friendly way a few of the burglars also, and I imagine, that on my return home, I should know a good deal about burglarious tactics and how to meet them.

So in military life. If we want to understand the practices of regular warfare, we must go to those who by regular warfare have added *tuum* to *meum* like the present possessors of Alsace-Lorraine, and to those whose *meum* is in danger of becoming *tuum* by the processes of regular warfare, as, for instance, the Belgians.

My purpose, then, this evening, is to offer certain propositions in connection with regular warfare for your consideration. Those propositions I shall put in the forefront, then I shall tell you what has given rise to them in my own mind and the conclusions to which, to me, they seem to lead. Whether they do so or not will be for you to determine.

The first proposition that I have to submit to you is, that all we can definitely determine with regard to the Tactical Operations of To-day, is the spirit which is to animate them, the principles which are to govern them ; forms and details are absolutely necessary, but must be tentative only ; and most strongly must be impressed on all who take part in tactical operations, that these forms and details are only tentative.

But why only tentative ? Tactics, we all know, depend on the arms in use ; a phrase which is so familiar to us that we seem to miss its meaning. The real meaning is that tactics and tactical operations depend for their success on the destructive—on the man-killing power of the weapons in the hands of the combatants ; and as to what is the man-killing—the destructive effect of the weapons of to-day, we are in a state of absolutely uncertainty ; all we know about them, and this is the next proposition I have to put forward for your acceptance, indicates that the effect of firearms is far greater to-day than it was in either 1870 or 1877. Victory lies in the hands of those who, *ceteris paribus*, have the greatest destructive power in their hands. Some there are, I know, who tell us that victory depends more on moral than on physical effect, that it is far better to kill 25 men out of a 100, if by so doing we make the remaining 75 run away, than to kill 99 out of a 100, if the one man left remains firm. So it may be, but still the victory will be with the combatant who kills the five-and-twenty first, and so we come back to the fact that it is the destructive power which governs the situation.

But it may be said that from the campaigns of 1870 and 1877 we can draw deductions for future guidance ; in fact our text-books and tactical books are full of such deductions. Those campaigns undoubtedly serve us as starting points, and supply us with certain plain facts, but of what use are they for future guidance ?

Once of a time a man who, I presume, was a conservative, went forth to battle with a helmet, a shield, a sword, and a spear, intent on

employing shock tactics; to meet him came a young man of radical tendencies, I suppose, who provided himself with a sling and a smooth pebble out of a brook. He employed fire tactics. The result of that very unequal encounter is known to most of us from our infancy. What deduction can be drawn from it as to how the combatants would have fared, if both had used the advanced tactics of those days, and been armed with slings and stones?

May I here remind commanding officers who I know are somewhat disposed to believe in reserving fire for short ranges, that this encounter is the first on record of the employment of long-range infantry fire. Let them lay the moral of this encounter to heart, and if they wish to emulate the distinguished career of the youthful David, let them believe like him in long-range infantry fire, otherwise the fate of Goliath of Gath may be theirs. Just as little use as this encounter, are for deduction for the future, the combats of the campaigns of modern times, for those of '59, '64, '66, '70 and '77 were all one-sided combats as regards armament, whereas in the combat of to-day the destructive power in the hands of the combatants will be equal, whether it be that of Artillery or of Infantry. This is a fact which must be carefully remembered when looking for lessons from the past.

And now for some of the reasons why I believe that this destructive power has increased since 1870. First, the training of the men and the officers in the use of the weapons, and I will speak first of Infantry fire only. It is abroad we must look, not at home. Junior officers have not the faintest idea of the different position in which Infantry fire stands to-day abroad from what it occupied in 1870, and how great is the progress it has made. That progress is, so to speak, embodied in that admirable work "*Mayne's Infantry Fire Tactics*." The materials for the book did not exist in 1870. The earliest reference in it is 1875. This book shows how the subject has been studied. The men are taken now and are put through a very careful training, a training which is becoming more and more understood. One of the most distinguished and the most experienced officers in our service to whom I was speaking about this said he thought I exaggerated the value of the training, that men were only a very short time with the colours, years elapsed before they were re-called to the ranks, and then they would have forgotten all their training. To this argument I demur altogether. Take two boys and teach both to play the fiddle, but teach one badly and the other well, let them give up playing for a time and then take to it again; surely he who was well taught originally will at once play the better of the two. So we may expect the general level of the shooting of the Infantry soldier of 1888 to be higher than that of 1870; for the better taught soldier of 1888 will shoot straighter than the less well taught soldier of 1870. But it does not follow that he is, either in our army or any other army, necessarily the more valuable soldier of the two. The value of a shooter in battle depends, as you all know, on something more important than power of hitting a target. It depends on whether he be a thorough soldier, by which we mean a man thoroughly obedient

to his non-commissioned officers and officers, even under the most trying circumstances, thoroughly under control, thoroughly well disciplined.

Discipline of fire is becoming far more difficult now than even in 1870, and unless that discipline has improved, the want of discipline will counteract the increased destructive power due to improvement in training. How important this fire discipline is considered in one of the continental armies, that of Germany, how necessary the Germans consider it to be that increase of the severity of fire discipline should go on, *pari passu*, with increase of killing power in the hands of the men, has lately received some striking illustrations.

A German officer present at the Delhi manœuvres, who has at Berlin deliberately stated in a lecture that in the English Army "when the attack commences all the outward forms of discipline are abandoned"—a statement which, if true, tells us that our fate in the combat of to-day is sealed—said also and truly, "an iron discipline is essential if troops who have," as he says ours have, "an innate love of fighting and who in rear, are on a modern battle field to be prevented from taking the law into their own hands, and, repeating the mistake committed by the Prussian Guards at St. Privat, of joining the fighting line without orders."

"In Germany," he says, "we look upon discipline as the main sheet anchor on which we rely to overcome man's inherent fear of death and danger, and we tighten up its bonds when the critical moment arrives." Those of us who know the German Army are accustomed to regard the discipline under which it is as *iron* already. But what is almost the first act of the Emperor Frederick on assuming the command of the Imperial Forces of Germany?

He saw plenty of fighting in '70, and knows what fire discipline is, and now he issues a notification that the drill is to be simplified. For what purpose? "Gaining more time and opportunity for thorough individual training, and for uniform and more strict training of the men in Fire Discipline, and the Discipline of the Combat."

When the Emperor of Germany issues an order to his army, that order is carried out in its integrity. In one army then in Europe, in the next war, the man-killing power of Infantry will be enormously increased, not only by improved training, but by more severe fire discipline.

I freely admit that on the increase of fire discipline depends the question whether the destructive power of Infantry is greater to-day than it was in 1870.

In connection with this question I may state that sometimes when Infantry officers have heard I was about to lecture on Tactics, they have said "for goodness sake dwell strongly on the necessity for fire discipline," adding, "*we have none in our army.*" The words are theirs, not mine.

But it is not so much the training of the men in mere shooting, as the training of the officers that will tell. The duty of the German officer as regards firing in 1870 was very simple. He waited until he

saw the enemy 500 paces from his men, and then all he had to say was "shoot." Now he has been told and taught what he can get out of the fire of his men. New spheres of employment of fire are open to him; long-range Infantry fire, indirect fire, inclined fire, independent firing, volley firing, firing with two or three sights, and above all, the enormous importance of fire discipline, on which all these fires depend for their value and effect. He has been taught how to kill the enemy, not only when he sees him, but when he does not see him. Think as little as you like of these devices. The difference between the German officer of to-day and of 1870 is, that whereas in that campaign he conducted a band of instrumentalists who could play one tune only, now they play that old tune better, and on it endless variations at pleasure, variations which are calculated to produce on an audience effects, to say the least, startling, and of an unpleasant practical character.

The next reason for presuming the increased destructive power of modern fire-arms lies in the increased value of long-range Infantry fire. Infantry fire in 1888 does not, for practical purposes, range a yard further than it did in 1870, but it will be far more effective at those long ranges. In 1870 and 1877 it was wild and casual. Now it is the most disciplined and best regulated and controlled of all kinds of fire. Surely it is well to be prepared for it, and so to be on the safe side. If we are about to engage in a pugilistic encounter with a friend or a foe about whose "reach" we are uncertain, but of whose length of reach there are traditions, and those of a time when he did not know how to use it to the best advantage, it is common prudence to be ready to meet it, if we hear that in the interval he has been in training for it. But it is not on traditions that our belief rests. Most of us have, I imagine, seen something of this kind of fire in peace time. A few years ago I stood at the butts in the rifle ranges here, and on a target bridge forty yards long by eight yards wide, for five minutes some thirty to fifty soldiers poured a wild fire from a distance of 2000 yards. Of the bullets, five per cent. fell on the bridge; often have I thought over that experiment since. I have used that bridge in imaginary schemes of rear-guards, convoys, advanced guards, and other tactical operations, and if there is anything whatever in that experience, all I can say is, that tactical operations to-day will have to be carried out in a very different fashion from what is laid down in our text books.

I am told that the defence should reserve its fire for short ranges; perhaps it will be well to do so as a rule, but is it credible that a defender who has in his hands a weapon which he knows kills at 3000 yards, is provided with ample supplies of ammunition, knows the ranges and has been trained and prepared for the use of this fire, will not at all events try it if opportunity offers? Of course he will; and then, what then? It is a maxim of Napoleon that "No man likes being killed without defending himself." The German officers in 1870 could not restrain their men returning the fire of the Chassepot, although they and the men knew their bullets would never reach the enemy; this impotence of the weapon was one of the reasons why those who held it pressed onward, and did not halt. But if the man

hit at long range has in his hands a weapon of equal power, the temptation to use it would be well nigh irresistible. It seems desirable, therefore, to be prepared not merely with formations which may counteract the effects of this fire; but also with such a system of control over the men as shall give us the best chance of restraining indulgence in this fire, and of keeping the men in hand if they are exposed to it.

And now for the shorter ranges, under 600 yards, for which fire is to be reserved. Why is every one so enthusiastic about reserving fire. Because, I presume, they think it will be effective; but how far effective? fairly effective, I suppose. And I should like, therefore, to put a question to the Infantry officers present accustomed to carry out an attack. How effective do you suppose this fire will be? Assume that your battalion of 800 men is in a shelter trench at the top of a hill with gently sloping open ground in front of you, and that 800 men on a front of 300 yards advance to the attack. Will your fire be so ineffective that they will ever reach your shelter trench? Surely not; surely you not only believe, but you know, that those 800 men will be destroyed, decimated, driven back, or brought to a stand still. But what is sauce for the goose is sauce for the gander, and if this be the fate of 800 Germans attacking you, it will be your fate if you and your 800 English attack 800 Germans, and if they are backed up by machine and Maxim guns and magazine rifles the result will be even more marked. It is desirable, therefore, that our training of battalions in the first line of attack should take into account catastrophes of this character, otherwise the demoralization and disorganization which will ensue will be permanent, not temporary.

When, then, in addition to the sources of improvement already mentioned, we have to add that due to the materiel, to the introduction of magazine rifles and of machine guns, we may safely predict that Infantry fire to-day is far more destructive and kills more at all ranges than it did in 1870.

And now as regards the destructive power of Artillery. As has been already mentioned, both sides in a combat will be equally well armed, for a difference of 50 feet per second in initial velocity, or of one foot in the curve of a trajectory, are trifles in determining the general result, and in all countries the improvement in materiel in guns, projectiles, and fuzes is immense. The Artillery of 1870 cannot be compared to that of 1888.

As regards the man-killing power of Artillery. I am, I know, one of a few, a very few, who believe in it. This disbelief is, in my opinion, so fraught with danger to the army, that this evening I shall do my best to convert you to the faith which I hold. But many difficulties are before me. In the first place there are few officers of the Infantry who, in preparing for their promotion examination, have not imbibed their ideas on Artillery from the teachings in Clery's "Minor Tactics," which book gives instances of Artillery fire practically out of date and antiquated.

The next difficulty lies in the impression produced by the well-known statistics of the relative effect of Infantry and Artillery fire

given in Colonel Home's "Précis of Tactics," and Lord Wolseley's "Soldier's Pocket Book," which are reproduced with parrot-like accuracy in many works on Tactics. They are generally taken to mean that during the Franco-German War only five per cent. of the losses inflicted were due to Artillery fire, whereas from ninety to ninety-four per cent. were due to Infantry fire. Some years ago these same statistics sorely puzzled me, so I determined to ascertain, if possible, their value. In the first place, I found that the five per cent. loss was only that inflicted on the Germans by the very indifferent and badly-armed French Artillery. Turning to Thival, a French writer, I found that the per-centage of loss caused to the French by the well-trained and well-armed German Artillery during the whole war was estimated at twenty-five per cent., a very different story. I then took nearly all the important battles of 1870-71, and selecting those regiments whose losses were heaviest I followed them through the fight, with the result that I found that these losses were incurred when the regiments advanced to attack Infantry opposed to them, and offered themselves as a target to the Infantry fire; as, for instance, at St. Privat, where some fourteen companies of the Guard Corps moved to the attack, and where, in the words of the official account, "the enemy's volley firing rent the companies asunder." In all cases the Artilleries were, as a rule, firing at each other, and Infantry at Infantry; hence the greater loss due to Infantry fire.

A third difficulty lies in the disbelief expressed by many Artillery officers in the man-killing power of their weapons. I leave them to plead against themselves. I am not a gunner, and I can go only on the evidence before me. But perhaps the greatest difficulty lies in the weight deservedly attached to the opinion expressed by Lord Wolseley in the "Soldier's Pocket Book." Lord Wolseley writes, "the effect of Artillery is more moral than real." So it may be, but then come the words, "it kills but few." These words are not written by Lord Wolseley as the Adjutant-General of the Army, but as a writer on Tactics, and on one point all writers on Tactics agree; it is the only point they do agree upon, they agree to disagree. Therefore, although it may appear presumption on my part, I disagree in this case, even from so experienced a soldier as Lord Wolseley. And in so doing I follow the lead of Prince Kraft of Hohenlohe Ingelfingen, a German officer who was in two, if not three, campaigns of Regular Warfare in Europe, has held high command in the German Artillery, and who tells us in his "*Briefe Über Artillerie*" (and we must take his evidence against his arm as well as for it), that he himself saw that in 1866 the Artillery killed but few because they made few hits; that from 1866 to 1870 they worked very hard to learn how to hit; with the result that in 1870 they killed not few but many, and for to-day he predicts they will kill yet more. I suppose that were I now to leave this room and Prince Kraft were to take my place and tell you what he himself saw the Artillery do in 1870, you would give some weight to what he said; in fact, it would be the talk of every mess in camp to-night. Prince Kraft shall therefore speak to you, for it is his words you will hear, though from my lips. And let me say that it is

no answer that the losses he tells you of were due to the faulty Infantry formations employed by the French. If the losses were due to the formation, they were caused by common shell used with percussion fuze, whereas any better formation will be exposed to shrapnel shell with time fuze, and eighteen years of better training and knowledge of the weapon.

First, as regards the ranges at which the Artillery did hit, he tells us that during the battle of Sedan, at one moment something was seen moving in the forest of the Ardennes, passing through a clearing. The batteries endeavoured to find the range. With elevation for a little more than 4000 paces they appeared to hit. "I considered that the range was too great for the gun to have any effect, and I was about to order it to cease when an evident disturbance in the enemy's ranks proved that our projectiles had reached him." The following day a staff officer passing the place found a team of a gun blown to pieces by the shells.

As regards fire at shorter ranges Prince Kraft was, himself, on the 18th August, on a spur running out south-west from St. Privat. Columns of French advanced against his guns up to 900 paces and then fled. The French staff officer of the general there said subsequently to the Prince, "It was impossible to succeed. You have no idea what it is to have to advance under fire of your Artillery."

Another German officer Colonel von Dresky, who was at Vionville says "The French Infantry advanced to the attack. We could only see a very thick line of skirmishers; as for the troops in column in rear we could see nothing of them. Our fire was directed on this line of skirmishers as it advanced, and as we had been in position since two o'clock and knew all the ranges, our shells made such gaps in the enemy's line that it, after having very bravely approached to a distance of about 1000 paces, and having been received with a rapid fire, answered with a hurried and ineffective discharge and then turned to the right-about and fled."

Here are simple statements which it is impossible to disbelieve. I know gunners sometimes attribute to their fire on a battle field effects due to other causes, but I know both these battles of Gravelotte and Vionville well, and I can affirm that no other troops to speak of were opposed to the French but German Artillery, and the losses were caused by them alone. But it is to the battle of Vionville, in which Colonel von Dresky's guns were engaged, that I must ask you to give for a few moments your close attention; for the result of the battle is simply inexplicable unless we credit the German Artillery with great man-killing power. Power far beyond five per cent.

I am afraid you will not accept as conclusive of the physical effect of the German Artillery, the evidence of General Frossard, who says that the reason why at mid-day his corps of 19,000 retired with a loss of 4000 men was the German Artillery fire, which he describes as *un feu d'artillerie des plus intenses*. You may say, perhaps, it was the moral, not the physical effect which produced the result. So let me set before you an arithmetical puzzle, and this is one of the few points in the lecture on which I will put myself in any way forward. I do

know this battle, and I have published a krieg-spiel of it giving, hour by hour, and in some cases, every half hour, the position of every single German battery and battalion and I can say therefore, positively, that it was essentially an Artillery battle so far as the Germans were concerned. My arithmetical puzzle is this. The French inflicted on the Germans a loss of over 14000 men. The Germans inflicted on the French a loss of over 16000 men. Take five per cent. as the losses on both sides from Artillery fire, and the odd numbers disappear, leaving 14000 Germans and 16000 French. Who inflicted the loss of 14000 Germans? a number of French Infantry soldiers equivalent to 120 German battalions, and armed with the chassepot, the deadliness of which at long ranges and short ranges was proved two days later at Gravelotte. And who killed the larger number of Frenchmen—the larger number, 16000? Why, less than half that number of German Infantry soldiers, 61 battalions, armed with a miserable fire-arm that was only effective up to 400 or 500 paces. Is this credible? It is simply incredible. But when we take Thival's estimate at twenty-five per cent. already mentioned as French loss from German Artillery fire, we find an answer to the riddle. Of this loss of 16000 French, we may put down to the German Artillery 4000; to their Infantry 12000, which is less than the Germans suffered from the French Infantry fire. Surely this battle proves that in 1870 good Artillery killed not a few, but many.

Artillery kills but few unless it has a chance of killing many, and then many it kills; and if in a future war you offer your Infantry as targets to it, you will find your targets well riddled. Only one word more as regards Artillery, and that is on the subject of Artillery *versus* Infantry. You are accustomed at field days to see Artillery constantly put out of action by umpires when Infantry open fire upon it. "From this," says Prince Kraft, "there gradually arises in the minds of the Artillery an idea that they cannot remain in action under Infantry fire," and in the minds of Infantry, I may myself add, an idea that they will always get the best of a fight with Artillery. As the Prince points out, this retiring of guns because they are under Infantry fire must, as a decision of the umpire, be obeyed, otherwise manœuvres become impossible, but such decisions are most unnatural.

"There were," he says, "hundreds and thousands of cases in the war of 1870-71 where Artillery which refused to retire could not be driven back by Infantry fire. I repeat yet once more, and I cannot too often repeat, Artillery cannot, generally speaking, ever be driven back by Infantry, if it refuses to leave its ground. On the contrary, when the Infantry fire is really hot, it cannot for the moment fall back, since too many of its horses will then be shot. But, nevertheless, nothing is lost so long as there are a couple of men left with each gun who can load and lay quietly, it can thus go on doing its full work until the last gunner is disabled."

Bearing in mind then, that whereas in the past the Germans had only common shell and no time fuzes, whereas they and all nations have now the best possible materiel of all kinds, I prophesy for Artillery, as for Infantry, a great increase in man-killing power, and I

accept Prince Kraft's estimate that at 5500 yards the effect of Artillery is noticeable ; at 3800 yards shrapnel begins ; at 2000-1500 it is decisive ; at 1100-1000 and under it is absolutely annihilating, whilst shrapnel with time-fuze set at zero is equal to case from smooth-bore guns. As regards Infantry, at 1700 yards Infantry fire begins ; at 1300 it makes some impression ; at 500 it is decisive ; at 200-300 and under it is annihilating.

Assuming then that it is in the highest degree probable, if not certain, that the man-killing power of weapons is to-day far greater than heretofore, but to what extent is uncertain, in what spirit must those who carry our tactical operations perform their task, and how must they be prepared for it ? It is not all the various tactical operations that we need consider ; all tactical operations have one element in common, and one on which their success rests ; it is the deciding element, the combat. It is the spirit of the combat only that we need consider.

But first let me give you Prince Kraft's views on the tactics of to-day. Prince Kraft is of opinion that fire is now so deadly that commanders may find the operation they have commenced impracticable, and may have to desist from prosecuting it, and be obliged to try some other plan. They will then draw off their troops ; this they will be able to do owing to the long ranges at which the battle has commenced, and consequently but few troops being engaged when the impracticability of the operation is recognized. If this view of the tactics of to-day be correct, the apportioning of duties to the officers, and the preparation of officers of all ranks for the combat will undergo a change which is almost startling ; for battles cease to be the unscientific Donnybrook encounters of 1870 ; we come back to the era of battle-tactics. It is no longer two street boys in a quarrel hitting out hard and direct, but blindly, at each other ; but two highly-trained prize-fighters sparring, feinting, circling round each other in a "ring" fixed by strategical considerations, seeking patiently for an opening, and when this is found, but not till then, planting the deadly and decisive blow. If this be the case, generals and colonels have before them a sphere of work and duty requiring careful study and preparation, and repaying a hundredfold, by its interest and importance, the loss of control and authority to which they must submit in the combat of to-day. And once more in tactics, as in strategy, it is the better soldier who will win.

And now as to the combat, and the authorized preparation for it. There are two ways in which we can prepare our sons, or those for whom we are responsible, if they are setting out on an expedition into some savage and barbarous country, an expedition sure to result in loss of life. One way is, first pointing out to them the honour and glory to be gained in accomplishing it, to tell them clearly of its dangers and its difficulties, how their wagons will break down, their teams will be exhausted, men and leader will lose their lives : and then to tell them how all these difficulties can be met and overcome, and how the losses of men and leaders can be made good ; to organize the expedition in view of what it really has to go through ; to practice in

its mechanism all those who are to take part in it; then to tell them that "Onwards" must be their motto, always pressing forwards, never looking back, confident that English pluck and English endurance will carry them to the goal. Forewarned, forearmed.

Of course there is another way also called preparation, but hardly worthy of the name. We may have full believe in our sons but not in some of those who are with them; and from any letter or instructions we may write for them we may exclude the dangers, which, however, they are perfectly aware exist. We may leave them to pick up experience for themselves. It is dangerous to tell them that some of them will be shot. So we will leave them to be shot, and after they are shot, let them find out how to make good their own loss. Which form of preparation is the better is a matter of opinion. For myself, I would open my own son's eyes as wide as possible, and I would tell him all I knew, for this reason, that expeditions of this kind are full of situations absolutely novel to those who take part in them; it is in the novelty lies the danger, for the danger of novelty is surprise, and surprise is the deadliest of all foes. Reduce to a minimum the chances of surprise, let a man be always prepared for surprise, and surprise then loses half its danger.

A combat very much resembles expeditions such as I have been referring to, and preparations for it may be conducted on either plan. Every army has its own system. I believe we have one in our army, but what it is, is immaterial to me just now, I have not come here to discuss it.

My mind is full of another system, that of the Belgian Army, a system which, theoretically at all events, seems to be interpenetrated with the soundest ideas as to the spirit in which the combat of to-day should be conducted; and the preparation, training, organization and control, necessary for the purpose.

But what your opinion on it will be depends entirely on the idea you have in your own mind as to what a combat in regular warfare is like. Not a score of English officers have ever seen such a combat, and but few have studied the accounts of these combats in sufficient detail really to understand them. To form correct ideas on the conduct of regular warfare of to-day is very difficult for the English officer, whether he has seen service or has not seen service. An officer who has not seen service knows the combat only by his experience in the Long Valley, or elsewhere, in peace manoeuvre exercises, and these have no resemblance to reality. An officer who has seen service must sweep from his mind all recollections of that service, for between Afghan, Egyptian, or Zulu warfare and that of Europe, there is no similarity whatever. To the latter the former is merely the play of children. Another difficulty in realizing the combat of to-day is in the fact that the English officer never does, and from the nature of the case never can practice it, at all events to any extent. Some little time ago I saw the Norfolk Regiment carry out a new "Attack." It was about the ten-thousandth introduced into our service since 1870; and it required a very powerful microscope to detect the difference between it and the 9999 which had

preceded it. The regiment advanced, however, up a valley, and then there was some firing, and some running about, and then a good deal of cheering, and then, all of a sudden, just as the attacking line had arrived some 300 or 400 yards from the enemy the whole thing came to an end—came to an end at the point where in regular warfare the combat really begins, that combat, preparation for which should be the main object of all our training, organization, and systems of control. It is the last 300 or 400 yards, not the first 1700 or 1600 which is the theatre of the combat of regular warfare. On it mere drill goes for *little*; organization, control, and discipline are *everything*. Those who have not studied in minute detail the combats of modern regular warfare, have little real knowledge of what they are like, or of the time they last. In 1870, at the battle of Wörth, the 50th German Regiment crossed the Sauer, and commenced fighting in the front line at about 10.30 a.m. At 5 p.m. at the end of the fight it is found in front of Froeschweiler. At Spichenen the 39th was in the front line for some 7½ hours. At Vionville the 24th were on the defensive in the front line for five hours, and then fell back with a loss of 50 officers and 1000 men (out of some 2400), all the officers of the Fusilier Battalion being *hors de combat*. It is for this work, so hard to realize, that not only tactical training but organization and systems of control must prepare the soldiers and officers of to-day.

A battle has been likened to the making of an omelette, and so it is; that advance over the first 1600 or 1700 yards is merely putting the butter, the lard, and the eggs on the kitchen dresser; in what order they are placed there is a matter of indifference, so long as they are at hand, and I am not aware that this matter is usually dealt with in recipes for omelette-making. It is the advance over the last 300 or 400 yards which is the making of the omelette; and on the practice, knowledge, training, and professional capacity of the cooks, depends, not only the result of the operation, but whether the eggs used shall be many or few. Let me speak plainly and openly on this subject. If we want to keep touch with the times, the day is past, it has passed long since, for brains being engaged on determining the comparatively unimportant matter of placing the ingredients on the dresser. One way is pretty well as good as another, and all thoughts and experience should be utilized on the solution of the difficulty, the making of the omelette, the getting the men successfully over the last 300 or 400 yards of the fight.

And now to return to the Belgian system. The Belgians recognize the facts of the combat of to-day; the increased destructive power of the weapons, the great loss of life among leaders as well as among men, the confusion of the battle field, the inevitable intermixture of units. They are convinced of the necessity for maintaining control, but that this control must be in the hands not of one, nor of a few, but of many. The spirit that breathes through them is one of trust and confidence in those under command, whether of a colonel in his captains, of captains in their subalterns, of officers in the non-commissioned officers, or of these in their men. Freedom for all to act as they deem best in the situations which may occur, but which cannot

be foreseen or provided for. The closest co-operation between all; implicit obedience to authority whether it be of low or of high degree.

In endeavouring to explain the Belgian system, I shall quote either from their own *Règlement* of the 1st September, 1886, or else I shall take the summary of the principles as given by Heusch in his work "*La Tactique d'aujourd'hui et de demain.*"

Speaking of the recruit, Heusch says "From his joining he is practised in taking the initiative, understanding ground, relying on his weapon, and fighting in extended order, but always in the hand of his commander." Here, then, at the very outset is recognized the fact, that in the combat of to-day situations may arrive in which even the rank and file must act for themselves, and therefore they must be practised in peace time in so acting.

But the Belgians are consistent, and they carry the same principle up into the higher ranks. For in the *Règlement* we read—"The initiative of the officers and non-commissioned officers exercises a great influence on the fight. It is desirable that the lower commanders should act vigorously of their own accord to ward off dangers which occur unexpectedly, or to take advantage of some fortunate chance. In such cases they will report without delay what they have done. They will abstain absolutely from giving orders which may be adverse to the general progress of the engagement.

"The major should encourage the spirit of the initiative among the officers and non-commissioned officers; with this view he will avoid concerning himself with executive details and will reserve all his power for the general control. He will interfere only if his intentions are misunderstood, or when he sees mistakes being made which may compromise the object he has in view."

But whilst the Belgians insist on the initiative being encouraged they equally insist that the men are always to be in hand. Whose hand? That of their immediate chief.

But in the heat of a fight it is only a few men who can be looked after by one chief. They provide therefore many chiefs, and to each of these in peace a few men, a few men only, are trained to look up to for guidance and control.

Sixteen men, eight files under a corporal, who stands on their flank in the ranks of the company is this small unit of fighting men. This corporal is their immediate chief, and of these squads (*escouades*) there are twelve in a company. Every two squads form a section under a sergeant, to whom the men and the two corporals look up as their immediate chief. There are six sections in the company; but the direct control of the captain is not yet reached, for every two sections are combined to form a peloton, under a subaltern officer, and these three officers are the link between the captain and his 192 or 200 men. The company is the tactical unit for the combat (*unité de combat*). In a battalion in line on parade the four companies stand three paces apart, and the commanding officer has under his command four fighting units, not so many pelotons, sections or squads.

And now let us see how this battalion is worked as a battalion in the front line of a brigade or division. The Belgians consider that as far

distant from the enemy as 5000 metres (= 5400 yards) the Artillery fire may compel the battalion to adopt a more open formation, but for drill purposes this distance is given at 3000 or 4000 metres (= $2\frac{1}{2}$ miles); and here the battalion forms into company columns, the flank pelotons of each company moving six paces in rear of the centre pelotons, and thus giving four columns of thirty-two files front and about ten yards deep. In this formation the battalion advances to where the Artillery fire will become dangerous, 2500 metres ($1\frac{1}{2}$ miles) from the enemy, and then it assumes the preparatory formation for the combat (*Formation préparatoire de combat*). The two centre companies halt whilst the two flank companies continue their advance for 300 metres in a line of columns of pelotons, and then they move forward again. A company, as has been already stated, consists of six sections; in forming columns of pelotons the even sections move six paces in rear of the odd sections, or *vice versa*, and at once we have in each company three little columns of sixteen files front and some six or seven yards depth. This advance line consists then of six such columns, covering the 300 metres of front of the battalion. Four scouting parties, each of four men, the four parties directed by two non-commissioned officers, precede at a distance of 150 metres the advanced line.

One of the characteristics of the Belgian formation for attack is their shallowness. On this point Heusch remarks that the idea which governed the earlier attack formations was the desirability of adopting such as were least vulnerable. "But," he says, "it was forgotten that the best tactical formation is not that based on a means of avoiding losses, nor even on the means which in theory enable the greatest amount of loss to be inflicted on the adversary. It must be remembered that the weapons are in the hands of human beings capable of being influenced by various impressions. In one word it is the moral effect which must be considered. This consideration obliges us to adopt in the attack tactical formations which allow the troops to be *impelled* forward, *carried* forward, *brought* up to the position animated by the determination to conquer. To do this we must make sacrifices as regards vulnerability to enable the action of the commanders to be felt."

Is not this an honest acknowledgment of what the majority of soldiers are under fire?

At 1400 metres (= 1500 yards), the first effective range of musketry, each of the leading companies takes the formation called *Formation de combat*. Leaving the centre pelotons as company reserves, the flank pelotons move out in close or extended order, and the front of the battalion is covered with a line of eight sections, the reserve pelotons following at a distance of 150 metres, the reserve companies closing up to 200 metres from them: the depth of the battalion being therefore, 350 metres.

Here at this point is an example of thorough decentralization of control. The commander of the battalion has under his direct orders only the two reserve companies. Captains control those in the advanced line, but even here two-thirds of each company are in advance under their subaltern officers, and the sections are under

their sergeants. Of course the battalion commander posted between the battalion reserve and the reserve companies retains a general superintendence of the whole, as do the captains posted between the reserve and the advanced pelotons, over their respective companies, and the subaltern over their two sections in line, but the dispositions are there of decentralization. But there is no fear of this decentralization leading to want of co-operation, the *Règlement* provides for this by its teachings. In its words "Each one, however low in rank, but vested with authority, must consider himself to be the link uniting those he commands with the commander from whom he himself receives orders. Thus will be formed a complete understanding between the commanding officers and the captains, between the officers and non-commissioned officers and the men, so that all will direct their efforts to one common end." Thus the battalion advances to 600 metres in open ground, further in close ground, and here the scouts halt, the shooters move up and form single file two paces apart.

Now commences the real combat, each of the two front companies rushes alternately forward fifty metres at a time, and then kneels, covering by its fire the advance of the other company. The Belgians prefer the kneeling position to the recumbent position. They consider it not more vulnerable, and moreover, they take the common sense view, that it is easier to get a man off his knees than off his stomach. The reserve pelotons are drawing near the shooting line. At 500 metres one of the sections is thrown into the shooting line to increase its fire, at 400 is thrown in the last section. For what purpose? To act as a propeller to the men in front, and give them an impulse forward. Yes, the Belgians admit that however brave a man may be, a time comes in the fight when his desire to go forward ceases, and that it is necessary then to push him on.

The word "*propulseur*" is their own, and in the *Règlement* it is stated that this acting as a "*propulseur*" is one of the duties of the rear echelons. Meantime, the other two companies of the battalion are coming nearer and nearer. The major is throwing first one and then another peloton forward into the fight. How they enter the fighting line, whether by doubling in with it, by prolonging it, or filling up some interval is a matter of no moment; they do not allow the front line to close in as in our service save exceptionally. For as Heusch says, "Why trouble about mixing up sections, when a few minutes later not only companies or battalions but regiments will be mixed up."

But the losses are heavy, confusion has set in; there is a check which may last for hours, the roar of battle is at its loudest. The tide has turned against the attacking force, it is temporarily driven back. What then? The extended order does not tell against it, it will rally at once, for as Heusch remarks, "A body of men *accustomed* to be dispersed but constantly exercised rallying quickly becomes as manageable as a mass in closed order." And this is exactly what the Belgian soldier is accustomed to. Over and over again on the parade ground and in the field has his company been purposely dispersed and scattered, and then rallied. Each company has a flag some eight inches by four inches of a particular colour, and in peace time it is to

this, when displayed, that he has rallied ; the habit has grown on him and now he looks for it instinctively, and to it he makes his way.

The company leader and the officers are perhaps *hors de combat* ; it seems as if the men were leaderless, but to the well-trained Belgian soldier, it is for this that the organization of his company has prepared him. What matter if all his officers have fallen ? They were not his immediate chiefs ! In peace time his immediate chiefs have been non-commissioned officers, or corporals ; and of the eighteen of his company some will be there, and if not there, on his own responsibility and his own initiative he must act ; but this is no novelty to him, and in his mind, by his training, he has acquired that knowledge of which Jomini says "It is the *habit* of moving in disorder which makes irregular troops *know* how to direct all their individual efforts to one common end."

And now all the battalion is firing in the front line. More than this is not expected of it. Most carefully worded, most carefully guarded are the first steps in training the Belgian soldier for the combat. In the "*Ecole de Soldat*," the "*Ecole de Compagnie*," and the "*Ecole de Battalion*," it is the reserve of the unit that comes up and with the front line carries the position. Having thus imbued the soldier with a feeling of confidence in himself ; in the "*Ecole de Régiment*," he learns for the first time that no battalion of the first line by itself will be able to win the day ; but that for a decisive battle as many as nine men per metre may be necessary for the purpose. At this crisis, then, the reserves are hurrying up from the rear ; the commanders of the rear battalions are expressly enjoined not to wait for orders but to act on their own judgment. Here and there fresh companies are being thrown into the shooting line, not merely increasing its fire but propelling it forward ; and at last by sheer superiority of fire, and of weight, the goal is reached, the combat is over, the victory is won.

With the termination of this imperfect sketch of the Spirit of the Belgian Regulations, my task, Gentlemen, comes to an end. You, whom I have been addressing, are practical soldiers, many of whom have already won, and many of whom will doubtless some day win honour for yourselves, and glory for your country in irregular warfare. My task, and it was a humble one, was to bring your minds in contact with the thoughts, ideas, and practices of those who, like yourselves, have won honour and glory not in irregular but in regular warfare. Those thoughts, ideas, and practices are, I think, worthy of your closest consideration. To that consideration I leave them, asking you to bear in mind that the foundation stone on which rests the whole edifice of the latest system of the combat of to-day, is decentralization of authority, and loyal acceptance by the lower ranks of the responsibility and duties which such decentralization involves. I ask you to remember that that foundation stone has been chosen by those who have had great experience of the combat of modern war ; and, in conclusion, I venture to say that no one who has studied modern war in detail can doubt, that compared to it, all other foundations are but of sand, and that armies which do not accept it in all its length, its depth, and breadth, can never hope for success in the combat of to-morrow or of to-day.

FIRING AT MOVING OBJECTS FROM SEA FRONTS.

BY

LIEUTENANT A. J. BREAKEY, R.A.

To the notes on "Firing at Moving Objects from Sea Fronts," by Captain Henriques, R.A., in "Proceedings," R.A. Institution, June, 1888, I should like to offer a few remarks, the result of some slight experience during a course of this kind of firing from the Western Forts, Isle of Wight, this drill season, and of notes made from time to time on other occasions.

As has been pointed out, the chief difficulties and uncertainties to be contended with, lie, in the inconstancy of the time taken in loading and laying the guns, in the difficulty of communicating the ever-varying ranges at the right moment to the right guns, and in the embarrassment caused to the directing officer by having his attention drawn from his duties of observation to watch when the guns are ready to lay.

Though it is unlikely that any system will ever be discovered which will entirely overcome these and the many other elements of difficulty to be met with, yet, I think that during the course above alluded to, we worked on one which promises, if properly carried out, at least to reduce them to a minimum. This system was based on what seem to be the two first principles of the subject, viz., that the guns must be layed for each round within a standard limit of time, and that time the shortest possible; and that the duties of those fighting a battery, though carried on concurrently, and mutually dependent, must be so arranged and portioned off, that squads and individuals have each only one class of work to perform.

The advantage of securing these two points is obvious, as the first in addition to saving valuable time, renders it possible to frame rules for allowances due to speed, &c., with reference to a constant time of laying and an average time of flight; and the second must reduce, if it does not altogether prevent, the confusion apt to occur in the heat of an engagement.

With regard to the laying, I think that all who have given the matter any thought, are pretty well agreed that unless men are specially trained to lay, on a fixed method and within a standard limit of time, it is useless to expect any, even fairly good results, in this kind of firing. Only a limited number of N.-C.-O.'s and men in a battery possess the qualifications necessary to make them good layers even at stationary objects, and with the target in motion the difficulty

is much increased ; but by selecting intelligent men with an aptitude for this work (which can very easily be tested) it is not difficult, with careful instruction and sufficient practice, to make them accurate layers at moving objects, and to secure their laying being completed, in a very short, and practically constant, space of time.

I saw a good instance of this in the case of the two Garrison batteries I was with in the Isle of Wight this year.

From each of them were selected about a dozen N.-C.-O.'s and men, and it was found that after a fortnight's training they could all be relied on to lay accurately, on a uniform system, at passing ships moving at various rates of speed, and at towed or drifting targets, in 15 seconds, which was taken as the standard of time proficiency. A like success had been attained in the case of several other batteries.

From what I have seen, I am convinced that unless a certain proportion of N.-C.-O.'s and men in every battery are so trained and kept efficient, no satisfactory results can possibly be attained in firing against objects moving at even moderate rates of speed.

There are of course some objections often urged against the idea of guns being laid only by certain individuals, but in the conditions under notice the case is a special one, and so much really depends upon the efficiency and accuracy of this portion of the gun-service that there appears to be no other way of securing the required results. Any time would evidently be wasted which was spent in trying to teach men to lay who were clearly incapable (as many are) of ever benefiting by the instruction.

Regarding the distribution of duties, they can be classed generally under three heads :—

1. Observation, making calculations and allowances, and general direction of the fire.
2. Communication of orders and results of observation.
3. Service of the guns (including laying).

A separate staff is required to carry out each of these. The first and second are under the immediate control of the directing officer, the first being, of course, performed by himself. The third is under the direct control of the officers in charge of groups, but obtains all information regarding ranges, deflection, &c., through the channel of communication from the directing officer.

All calculations and allowances should be made by the directing officer at the observing station. In large works more than one observing station may be necessary, and to prevent confusion a certain number of guns would be told off to each, the defence of the work being split into sections, each internally complete.

The directing officer is relieved of a considerable strain if the depression range-finder is worked by assistants, as he is thereby left free to watch the fire and make the necessary calculations for deflection, &c.

We worked this way during our course with satisfactory results. Two N.-C.-O.'s who understood the instrument had charge of it ; one

followed the objects through the telescope, the other read the ranges off the drum at intervals depending on the speed, under the direction of the directing officer.

The communication of the ranges to the guns was effected in the following way:—As they were read out by the N.-C.-O. at the range-finder, the directing officer made the necessary additions and deductions, and then caused them to be shown on a large dial suitably graduated, which was worked by a couple of men, and set up on a portable stand adjacent to the observing station. Other dials similar to this were erected in rear of each group of guns in view of the main dial, and the men working them were taught to shift the pointers as the readings changed on the main dial, so as to indicate the ranges shown on it to the guns.

Thus, when ready to lay, the Nos. 1 had only to glance back at the range-dial belonging to the group their guns were in, to ascertain the range; but, as in the generality of cases, this range was either increasing or decreasing, and at the observing station a new range was read about every 20 seconds, the laying numbers were taught to set their tangent scales to the next range that would appear on the dials, and not to commence laying until the pointers marked it.

Now, at the instant the laying began, the tangent scales were not set at the actual range of the object, for a correction had been made (as stated above) by the directing officer before the range was registered on the dials.

This correction was the addition or subtraction (from the range read off the range-finder) of the distance the object would travel during the time of laying, viz., 15 seconds, plus the time of flight of the projectile taken at an average of five seconds, or 20 seconds in all. Thus the Nos. 1 were, so to speak, laying 20 seconds ahead of the object when they started, though the impact of the projectile with it took place at the end of that time when the object had reached the range at which the tangent scales were set.

Information regarding the amount of deflection to be given, as well as any general directions, were sent by orderlies from the directing officer to the officers commanding groups.

The method described above does away with the inconvenience pointed out by Captain Henriques of having to alter the elevation and re-lay a gun; as, even if a vessel changed her course or her speed in the middle of the operation of laying, there would still be a fair chance of the shot proving effective, so short the time till it reached its destination. The length of most ships would be an additional factor in favour of this.

Then again, bearing in mind that the *raison d'être* of most of the works on sea fronts is the defence of a channel or roadstead, and that the navigable space therein is usually limited, the conditions are unfavourable to great deviations in course or speed by individual ships of a squadron attempting their passage (except such alterations in course as would be necessary from a change in the direction of the channel, and which could be anticipated by the defenders);

and the possibility of collisions or running aground would doubtless in many instances prevent them being tried sufficiently to embarrass, to any serious extent, those working the guns on shore.

It is clearly a great advantage if signals from Nos. 1 of the guns to the observing station can be done without, the observing staff being saved the strain of having to keep a watch for them, and a cross-fire of communications thereby prevented; for all would then pass in one direction only, from the directing officer to the guns.

I have only roughly touched on the outlines of the system we worked on, and have not attempted to describe details or to set down the rules employed for calculating the various allowances, &c. All this can be better done by those with whom the credit of its existence lies, and will no doubt be published for the benefit of the service in due course.

It may however be remarked that no matter what the perfection of arrangements against attack, unless they are submitted to ample rehearsal by those who have to carry them out, there is little chance of their proving efficacious at the time when their application is required in real earnest.

PORTSMOUTH,

28th August, 1888.

SHRAPNEL SHELL AGAINST TROOPS UNDER COVER.

BY

CAPTAIN W. L. WHITE, R.A.

WE were all, or almost all, brought up to believe, and most of us teach our men to repeat with glib fluency, that shrapnel shell are for use against troops in the open and common shell against troops under cover. This dogma is certainly true but not exhaustive. There are occasions when the fire of shrapnel is infinitely more effective than that of common shell against an enemy under cover, as far as destruction of life goes, though the damage to the cover itself will be comparatively small. Now, too, with steel common shell, the walls are very thin and there are consequently fewer dangerous fragments.

The experience of the American war, in which shrapnel shell with percussion fuzes were used with great effect against troops holding the lightly built houses which are usually found in the Southern States, seems, of late years, to have been lost sight of by Artillerists on shore, though the Naval gunner recognises the enormously destructive power of a percussion shrapnel against a lightly protected or unarmoured vessel.

The original intention of carrying out the following experiments was suggested to the writer by Major Walford, R.A., when viewing the village of Wörth from the German Artillery position of the 6th August, 1870. Looking at the nature of the houses, which are built of horizontal and vertical beams enclosing panels of "wattle and dab," the question was discussed as to whether percussion shrapnel would not be more effective than common shell.

Now very little is known of the effect of percussion shrapnel from field guns against troops behind such cover as walls, and doubts were expressed as to the action of shrapnel with bursting charge in the head being satisfactory.

On my return to Shoebury two targets were prepared for the experiments, the range being 900 yards. The gun used was the 12-pr. B.L. with steel shrapnel shell and small percussion fuzes.

No. I. target was an enclosed space representing a room 18 ft. square and 9 ft. high, the front wall of which was composed of two rows of targets some 18 inches apart, the space between them being filled in with earth. This was an effort to prepare a target which should

approximately represent the resistance which would be presented by the wall of such a house as one usually finds in the rural districts of the continent.—*Vide* drawing.

The two first rounds passed through the front wall above the level of the earth between the targets. The resistance of the latter was so slight that the fuzes did not act until the shells had nearly passed across the room, the consequence being that the shells burst close to the back wall, forming on it two neat circles about 2 ft. in diameter and punched full of holes like the lid of a pepper pot.

The next two rounds penetrated the earth of the front wall and burst just inside the enclosure, the base of one coming off just as the shell left the inner face of the front wall. The result was most conclusive, the back wall of the enclosure was literally riddled in all directions, and all the dummies inside hit, one being literally cut in half by the storm of "mitraille."

The second experiment was more interesting, the first target being only a makeshift the results were not conclusive.

The second target consisted of an enclosed space 27 ft. square and 9 ft. high, the centre 6 ft. of the front wall being of brick of the dimensions shewn in the drawing.

It will be noticed that the thinner portion of the wall, $13\frac{1}{2}$ inches, represents nearly the dimensions of modern houses. Whereas the thicker portion, 26 inches, would be about the thickness met with in older houses and in substantial public buildings.

The numbered circles on the elevation of the masonry show the successive hits, the dotted lines, the portions of wall broken away by each round. If these hits had been made in a large surface of wall, in which support would have been given by the surrounding brick work, it is probable that less effect from "demolition" would have been obtained. Though there is no doubt, from the velocity of the fragments of shell after passing the target, that the shell would, even then, have penetrated easily.

Round No. 1 struck rather low down and, there being a slight ridge of ground about 14 inches high across the enclosed space, a large proportion of the lower cone of dispersion was arrested and some part deflected upwards, which will explain the scattered appearance of the hits of this round on the target; only 74 effective hits being made on the target. The drawing will explain the action of rounds 2, 3 and 4. Only effective hits, *i.e.*, throughs and lodges, have been scored. All the rounds appeared to burst just inside the enclosure. The portion of the target left standing after round 4 was so cracked as to be useless for further experiment.

It will be noticed that the effect is mainly on the centre target. This, of course, arises from the fact that the portion of wall was opposite that target; had the whole of the front of the enclosure been of masonry, two shell, one placed some 8 feet from each side wall, would have effectually cleared out the whole space.

These experiments require completion, in that results should be obtained against stone walls of various descriptions, and also against

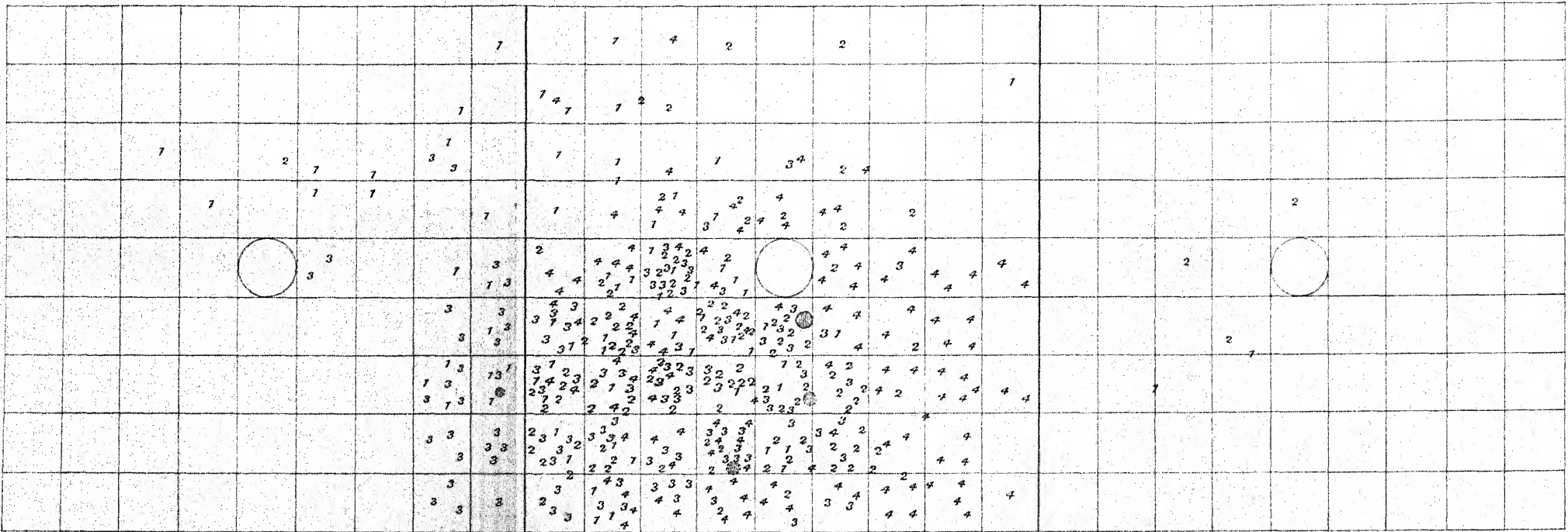
the tough mud walls of the East, which I am afraid could not be reproduced in England for experimental purposes. It is with the hope that some officers, to whom opportunity may occur, will complete the series, that I have ventured to submit these observations.

If percussion shrapnel are of any use against mud walls, their employment would be most desirable, as I believe I am right in saying that the mud hut at Kirbekan before which the late General Earle lost his life, and also a similar structure at Giniss were both unsuccessfully assailed with common shell.

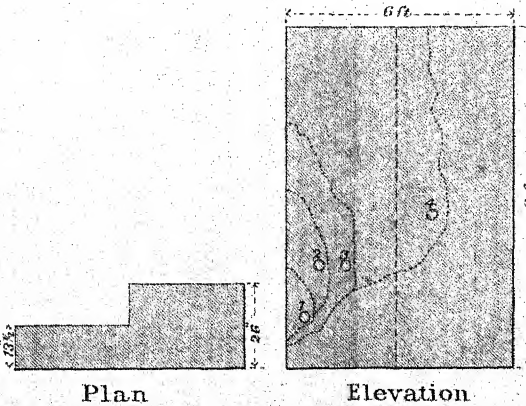
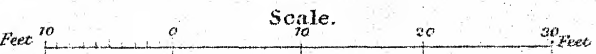
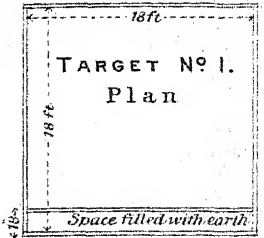
SHOEBURYNESSE,

June, 1888.

REAR ROW OF TARGETS (Nº2) AFTER PRACTICE.



	Effective Hits.
Round Nº 1	74.
" 2	116.
" 3	118.
" 4	116.
Total	<u>424.</u>



ENLARGED SKETCH OF MASONRY PORTION OF Nº 2 TARGET.

R

7 4

7

7

2

4

4

3

3

3

3

7

2

2

2

3

2

3

2

3

Count

EXAMPLES OF FORCED MARCHES PERFORMED BY HORSE ARTILLERY AND LOSSES IN ACTION SUFFERED BY THEM.

BY

CAPTAIN W. J. ROBERTSON, R.H.A.

THE connection between these two subjects may not seem to all very clear; but they may very well be ranked together, as they form two reasons for the existence of the Arm; and if they could be swept aside, the Horse Artillery Division with the Corps Artillery, could be supplanted by Field Artillery.

Forced marching depends on several things, amongst others:—

- (1.) The determined will of the Commander.
- (2.) The quality of the horses.
- (3.) Their condition, and food.
- (4.) The weights, &c., to be carried and drawn.

Most people, I fancy, would not have placed the “will of the Commander” first, but without it nothing worthy of the name can be done.

“‘I am making, and I mean to make,’ wrote Daly on the 1st of June, ‘the best march that has been heard of in this land,’ and right nobly he performed it.”¹

This is the kind of spirit that is needed, and without it a good march will never be performed. Captain Daly brought the Guides to the relief of Delhi in the hottest time of the year—580 miles in 22 days; over 26 miles a day. This is, I expect, the best long distance march made by Infantry—when the heat of the Punjaub is taken into consideration.

The “will” of the leader must be strong enough to master all else,—John Nicholson, Hodson, and Clive are the kind of people likely to succeed in this kind of work.

(2.) *The quality of the horses.*—Everybody knows that Horse Artillery should be the best horsed part of the Service; seeing that our gun teams have not only to carry a weight on their backs, but draw a load of 36 cwt. or so in addition. And I suppose most Englishmen think that an English horse is the best stamp of animal.

Extensive trials once took place in Madras to test the relative merit

¹ Kaye's Sepoy war.

of entire horses and geldings, and strange to say, by no means to the disadvantage of the latter. However, as soldiers, we have to make the best of what we are given.

(3.) *Condition* is not an easy thing to write about; Mercer says in his Journal of G Troop, when in Belgium:—"Our allowance of forage, though sufficient to keep our horses in pretty good condition when idle, was not sufficient when they were hard worked, nor was it sufficient at any time to put on them that load of flesh and give them that rotundity of form which Peninsular practice had established as the beau-ideal of a horse entering on a campaign."

It is very seldom a battery commander is found fault with for his horses being too fat.

When I was beginning to train some horses for a long trial march, an officer told me he thought I was wrong in putting the draught horses so much in collar work. I was surprised at the remark, and by no means agreed, but after the event saw he had been right, and that once a horse was really hard he would not gall anywhere; I will draw attention to this later on.

Of course, as regards food in a forced march, one naturally tries to get all the horses will eat, and on service with a smallish force probably this may often be done.

(4.) *With regard to the weight to be carried or drawn.*—It has been laid down that 6 cwt. should be the maximum load for each horse, that gives therefore 36 cwt. for the team—this however is often exceeded. For instance the load with the 9-pr. with two gunners at 13 stone each is 37 cwt. 1 qr. 10 lbs., while the wagon weighs 40 cwt.

Let me now draw attention to the Prussian horses in the war of 1866. In the official account we read that on the 7th July (four days after Königgrätz) General von Hartmann learnt that the enemy were still many miles ahead.

HORSE ARTILLERY IN PURSUIT.

At half-past 1 p.m., therefore, the General (von Hartmann) gave orders for the formation of a special detachment still further forward at Nedosin, consisting of 700 horses and two Horse Artillery guns under Lient.-Colonel von Barnekow. The 1st and 5th Cuirassiers and the 10th Hussars gave each 200, the 2nd Hussars 100 of their best horses, and Lieut.-Colonel v. Barnekow was instructed to follow close upon the heels of the enemy and to inflict as much damage as possible. This measure was reported to head-quarters of the 5th Corps, and the statement added that the Division itself was prepared to make a forced march, and to follow Colonel v. Barnekow next day.

The detachment of the latter started at 6.30 p.m. from Nedosin and arrived in front of Zwittau, without meeting with any resistance, at 8.30 p.m. just as darkness was setting in. Bivouac fires of the enemy were visible in a wide circle round the town, but no outposts were thrown out in front of them. The troops encamped here in the foremost line;

south westward of the town were the Austrian VIIIth Corps, northwards of the town the last detachments of the Saxons, two battalions and four batteries, which had arrived in the course of the afternoon.

Lieut.-Colonel Barnekow's two guns unlimbered, and disturbed the enemy's camp by throwing a few shells into it. As was discovered afterwards, this caused the greatest confusion among the Austrian military train which was parked there, and induced the Saxon detachment to fall back hastily through Zwittau upon the main body of the Corps, which was encamped at Mährisch Hersmersdorf, south eastward of the town.¹

This occurred on the 7th. On the 10th we read:—"General Hartmann's Cavalry Division halted on this as well as on the following day, as it had great need of rest. . . . They had marched without break 97 miles in the last three days. Besides those horses which had been left behind for lameness or sickness, the regiments still had upon an average 150 horses each that were unfit for service; one-third of the horses of the Landwehr were lame."

Now, if this appears in an official report, I think we will all agree that it is not likely to be exaggerated. And yet in sober English it is bad enough. It is therefore extremely curious to see what they attribute such a lamentable state of things to. This is what it says:—"It had been partly caused by the exertions of marching, of picquets, patrol and orderly service, and partly by the impossibility of keeping the horses' shoes in permanent order."

Now by about the 20th May the regiments had been mobilized; granting therefore 10 days for setting to work, it does seem strange that with 40 days work the horses were not in better condition and better shod.

I can find little data about these same horses in 1870 under the same General. (It is a little strange that Prince Hohenlohe does not allude in his letters to the condition and state of his horses).

I came across this in Colonel Duncan's "History of the Regiment." "In recent times the most remarkable march made by Artillery, was on one occasion during the Indian mutiny, when a battery of R.H.A. marched 78 miles in 24 hours, and continued marching, elephants carrying the forage.—Communicated by Sir D. E. Wood, K.C.B.," but unfortunately there are no details.²

It was about the 1st July, 1886, that the idea struck me of having a long distance march. There had been at that time none that I was aware of, and having just read the account of the late Colonel Barrow's march in Egypt, it struck me that if I were suddenly ordered to perform a long march I should by no means be certain what to promise

¹ German official account of 1866, p. 310.

² Since writing this, I have found out from Sir David Wood that this was old "E" Troop, now F/A, R.H.A., then under the command of Major J. R. Anderson. I hope at some future time to be able to give the details of this.

I could perform beforehand. On reflection, I made up my mind to try a march of 250 miles in four days. I was then in command of M/B for six months.

The first thing was to enlist the sympathies of the two subaltern officers, the next to call for volunteers among the men. This having been done, I obtained permission to have a march in and out of cantonments on the understanding that the Veterinary Surgeon was to be consulted and no horse done to death or permanently injured. Being only in temporary command of the battery, it was clear that I had no right to run the risk of permanently hurting the battery by taking horses that were posted in the gun-teams or were an acquisition in other posts. While it was clear that the ordinary work and drill of the battery must go on as usual, these two things confined the experiment to a single gun-team and detachment.

I selected for the horses—the lead and centre of the forge, (a likely kind of place for ugly animals). A very coarse underbred ugly horse that ran in the shafts of a wagon, and was an animal that was my special aversion, and that I secretly hoped might die in the experiment, (his number was 43): to run with him I had to take rather a nice horse that went with him, viz, 146; a spare wheel horse (108) that could easily be spared, and another wagon horse (106) that matched him. This completed the gun team, and gave one pair spare. The oldest of these was 15, the youngest 10; the tallest 15.2, the lowest 15.

As regards the detachment horses, I selected one, as he was about to be cast for age, 17, a stud-bred—an excellent horse he had been. The Sergeant-Major selected two for being unsteady in the ranks; a fourth was chosen as he had bad skin disease and we wanted to see if it improved with work; a fifth was thrown in for his ugliness; and the 6th, the N.-C.-O. who was going in charge, begged for, as it was his own. This was the only good looking horse of the lot and the only one that the Veterinary Surgeon obliged us to withdraw during the experiment, viz., No. 10.

Two other horses were taken for the preparative work, in case anything happened, one never started, the other (150) carried the N.-C.-O. when his horse was withdrawn, but is not therefore counted as being in the hunt at all.¹

Of the detachment horses two were 15.2 and four under that height. Out of the whole 14, all but one were Walers, nine had come originally from Saharapore stud and two from Oosoor. (See Appendix I.)

As regards the practice work it began on the 8th July, and on that and the following day they did 12 and 15 miles; their food having

¹ I was once annoyed at a remark that the march was valueless, as I had substituted horses during the trial. No horse was put in except this horse, and I have not counted him or his rider. What occurred was, that after the 47th mile, the Veterinary Surgeon asked for the No. 1's horse, No. 10, to be withdrawn. This I was obliged to accede to, though, as it happened, the animal was at his ordinary work again in three days. The question then arose what to do with his rider? in war one would dismount another man, but here it seemed hardly fair, so I gave him No. 150, who did the remaining 116 miles in 52½ hours, carrying a man of over 13 stone. But this man I have not counted as arriving as a gun number, but is reckoned as fallen out.

been increased with 2 lb. of Bengal gram, in addition to the ordinary 10 lb. of boiled coolthi.

The four following days this gram was increased to 4 lb., and their grass to 60 lbs.; as regards work, on the 10th, 20 miles; on the 11th, they had only two hours walking exercise; on the 12th, 25; and on the 13th, 28 miles.

All the above had been in draught, but on the 14th I took them for a spin of 44 miles (22 without the gun), increasing their food again to 6 lb. of gram, and for 60 lb. of grass substituting 20 lb. of hay (Indian hay remember), and 30 lb. of grass. It remained at this till the 19th. On the 15th they only had two hours walking exercise; on the 16th, 42 miles in draught; and on the 17th, 20 miles. The 18th they only did two hours walking exercise. On the 19th, the day preceding the trial, I increased the food again by 2 lbs., at which quantity it remained during the march, viz., 10 lb. of coolthi, 8 of gram, 25 of hay, and 20 of grass. That day they did 20 miles. (*See Appendix II.*)

The practice work would have been longer but for the fact that just at this time I was laid up for a few days with the beginning of an illness for which I was finally sent home the following spring, I was therefore unable to ride with them as I had hoped, and was only able to drag myself down to the lines. To make matters worse the senior subaltern had been suffering off and on with fever, and the other therefore advised me breaking it off. It was therefore settled that we would begin on the next day, and hope for the best.

20th July.—On this date at 5 a.m. the march began. It was arranged that about 30 miles should be done in the morning, then a rest, and the second 30 in the afternoon. One officer going in the morning, the other in the afternoon; it was also agreed that two detachment horses should always be hooked in with their long traces, thus giving eight horses to the gun without coming on the spare pair. I will also add that as a rule the same horses did not go in the wheel both morning and evening. In fact to keep the wheel properly supplied was the great difficulty; in all, six horses were tried there. Well, at five, then the party started with eight horses in the gun (two being detachment horses), four other detachment, and one pair of spare wheel; that is four drivers, six mounted men in the detachment, and one limber gunner, Lieut. Hunter-Blair being in charge. Eight miles out they watered and halted 10 minutes. At 17½ miles from Bangalore they halted again for 40 minutes; watered and returned in the same manner, arriving just at noon, i.e., 35 miles in seven hours. This was just the pace previously settled on, five miles an hour, including the three halts; or close on six in actual pace, (one halt in 40 minutes, and two of 10, in all, one hour or 35 miles in six hours of work).

At 2.30 they started again, Lieut. J. T. Johnston in charge. As the Veterinary Surgeon wanted to see them that afternoon, they went out only six miles and returned; while feeding, the Veterinary Surgeon inspected them, and much to my grief asked me to withdraw the No. 1's horse, as he considered if he went on he would be sure to break down. This therefore was done, and the man mounted as described

before. Another 18 miles was then knocked off, the party returning at 8 p.m. This was therefore, for the afternoon, 30 miles in $5\frac{1}{2}$ hours, which, as they halted 60 minutes, was in reality 30 miles in $4\frac{1}{2}$ hours, a little over the six miles an hour.

As some of the horses needed shoeing, and none could but have more than nine hours rest, it was considered unwise to bother them with grooming, so they were only rubbed down.

65 miles for the first day was not bad, though we had practically left a man and horse behind.

21st July.—Started again at five with Blair in charge; the horses seemed stiff and tired. He went out nine miles, watered and returned at 8.15 a.m.—18 miles in $3\frac{1}{4}$ hours. After a 40 minutes halt he started again, this time going out six miles. He returned at 1.15, having found the horses very difficult to get along; in doing these last 12 miles he had been 4 hours 20 minutes, or deducting a halt of 10 minutes, a little over four hours, that is but three miles an hour. Owing to this they could not start again till 3 p.m. Personally, I own, I thought they would break down, but disguised my feelings. Johnston took them straight away $15\frac{1}{2}$ miles and returned at 9 p.m., having done 31 miles in five hours of work and one hour of rest, just the same speed as the day before. I wished instead of being a Captain I was a Commander-in-Chief, who could there and then have presented him with a medal or a K.C.B.-ship or something. They had thus done 61 miles in this their second day or 125 miles in 40 hours, while no more horses had fallen out.

22nd July.—Johnston started off again in the morning at 5 a.m. The horses seemed less stiff than the day before, and by noon he had done 31 miles—making 156 miles in 55 hours. He had however to strike out No. 142 at six miles from home as unable to keep up, he was led in an hour later, and the man rode in future on the limber.

At 3 p.m. Blair went off again, 14 miles were worked off when the ugly animal (43) who was as vicious as he was plain, came down and cut his knees (he had been down before but not so badly), and on service he could have gone on, now he was discarded, he had gone the previous day 53 miles in the shafts and eight miles as spare. This reduced the spare horses to one.

In all, this afternoon 24 miles were done by Blair in six hours, making 55 in the day, or 181 miles in 64 hours.

23rd July.—At 5 a.m. they started, that is those remaining, having lost in all two detachment horses and one man, (the other man being on the limber) and one draught horse, it left for the gun four drivers and six gunners. Having done 18 miles, the horses were inspected by the Veterinary Surgeon, and as he could not certify if they attempted to do another 50 miles that day by midnight that no horse might die, the march was, much to my disappointment, ordered to be stopped. I must own, however, there was a strong probability that if continued an accident might have happened. About an hour later they were seen by Colonel Smart, Commanding the District, and I think there

can be no harm in my stating that he said "he had often seen coach horses after a long stage more stiff."

They had thus done 199 miles in 76 consecutive hours, or as I prefer to put it, they did 181 miles in 64 consecutive hours, and on the following day marched close on 20 miles (an ordinary march). That the gun was fit to have gone into action none can doubt. Though I admit on the other hand that had a stranger seen the horses without knowing what they had done he would have pronounced most of them lame. (See Appendix III.)

None of the horses finally suffered except 43, who had knees a little more blemished than before. It may interest some unknown officer of the regiment to hear that one of the lead of the forge, a grey, was an officer's horse, and was returned to the ranks on 5th January, 1876, but I don't know to what battery.

Well, but somebody says, "how about galls?" The strange fact is that there were none. During the practice work we had our share, but it appeared once the horses became really hard, no more came, even when a horse was put in a fresh place. 38, 151, 146, 106, among the team, and 67, 63, and 7, had no galls whatever. 153 had slight trace galls, 154 a slight crupper gall, 108 had an old crupper gall, while 54 had hair off in one patch under the saddle, the nearest approach we had to a sore back, though it was far from one.

The harness used was the usual service harness, except that a pad was inserted under the breast harness of the two horses in draught, and which nothing would ever induce me with a Horse Artillery battery to go on service without.

Had the march been continued, I expect in the next 30 miles one draught horse and one detachment would have knocked up, not more, and that with longer training more might have been done. Anyhow with a battery of Walers I would stake my reputation to take the guns, and detachments of four, 230 miles in four days, and be ready to come into action at the end of it. If a wagon was wanted it could only be done by devoting 10 horses to it; perhaps thus, three wagons might in some batteries be brought along.

The plan would be to draft all the cripples and weaker horses to four wagons and leave them with an officer to come on as quickly as found possible, and to start with the guns, detachments of six, and six pair of spare horses and two wagons, with any other spare horses available.

At the end of each day any horses unable to go on could be left, either to follow on, or to wait to be picked up by the rearmost wagons.

Both in Europe and in India extra food no doubt could be often obtained, and in the first case probably extra means or help.

During the Bristol riots in 1829, I am told a troop of Horse Artillery marched without halting for more than food from Woolwich to Bristol; they had to take some small-arm ammunition with them in a cart, and as it broke down, borrowed a hearse to take its place. In those days, horses excellent for the work would be procurable in good number at all the stages along the road. I have found a good instance in India of eeka ponies being thus impressed and doing 90 miles in 30 hours.

I might add in reference to my own march that the distances were all carefully and accurately vouched for by Lieutenants Johnston and Hunter-Blair, to whose care and attention the success of the march was due.

LOSSES.

One can practice most things in peace, but one cannot practice loss as occurs in action.

Occasionally a man is hurt at drill and the parade perhaps is brought to an abrupt conclusion,—surely a mistake.

It is told of Seidlitz the great Cavalry leader that when his master Frederick found fault with the number of deaths that had occurred through accidents at drill, he replied, "If you make such a fuss about a few broken necks, your Majesty will never have the bold horsemen you require for the field."

It is a question whether our men are not now taken too much care of; but even setting drill on one side, losses in action cannot be practised.

Nothing surprised me more than to learn that a battery of Horse Artillery in the last Afghan campaign that was constantly in action, and whose men received three clasps, only lost one officer killed in action and one man wounded.

In Captain Hoffbauer's book occurs a passage that has puzzled me a good deal. In the returns of the casualties, the "Hessian" battery is shown as having lost 1 officer, 6 men, and 22 horses killed, 1 officer, 4 men, and 15 horses wounded; a total of 2 officers, 30 men, and 37 horses. This I presume is authentic. Now let me give the passage:—

GRAVELOTTE.

Soon after the commencement of the battle by the Artillery of the 18th Division and Corps Artillery of the IXth Corps, the Hessian Horse Artillery battery, Captain Freiherr von Schäffen-Bernstein, having crossed the Bois de la Cusse, by General von Schlotheim's orders, came into action near the south end of that wood and north of Verneville. While the second row of wagons remained throughout the battle at Anoux la Grange, the first followed the battery, halting 130 paces in its right rear.

93 shells were fired at 1700 paces at the hostile Artillery, which was under cover. The loss of men and horses was considerable at the wagons as well as at the guns, a wagon horse and a limber horse being killed. It was impossible for the battery to hold its ground opposed to the accurate and greatly superior fire of the enemy; it decided therefore on retiring and getting supplies from the 2nd line of wagons.

As soon as this was completed the battery returned to the field of battle between 1 and 2 p.m. A gun left on the ground, owing to the loss of horses, afterwards missed the battery, and came into action with the Hessian battery under Reh, to which it was attached by Major von Herget.¹

¹ p. 188,

This is badly expressed ; I presume it means the losses were so great that it had to retire with the wagon horses (even two of these having previously been killed), leaving one gun and all the six wagons on the ground.

This however would not account for only 37 horses being lost, but matters are still harder to understand, for later in the day we read :— "The Hessian Horse Artillery battery was now able to get closer to the hostile Infantry, and under the command of 2nd Lieut. Draudt, resolutely advanced to a position between Champenois and L'Envie about 4.30 p.m., rapidly driving back some French Infantry which had approached to within 900 paces. The battery then fired on both Infantry and Artillery, but after a short time two more guns became unserviceable so that the battery was now reduced to two guns. (The wedge of one gun was rendered immovable by "fouling," and in the other gun the screw of the wedge was bent in such a way that it could not be withdrawn").¹

Now the combatant part of a Horse Artillery battery, with its line of wagons, is given as 150 men and 207 horses, without the wagons 74 men and 96 horses). (See Appendix IV.)

The loss in the second action must have been severe, but even assuming it to have been nil one cannot understand why 37 horses should render necessary six wagons and one gun being left behind. Guns can surely be brought out of action with four horses, and it would be a new thing to learn that the detachment horses were not available for this work. Again, as regards men they lost, only 30 are returned as disabled. The only way to account for it, would be by supposing that batteries went into action very short of their proper strength.

Now let me close with one example from Captain Hoffbauer's book, it occurs at Gravelotte. The battery was one of those which succeeded in crossing the causeway or defile, which in a previous paper I described a battery belonging to the 1st Cavalry Division trying to cross among these very batteries.

Major Coester is the type of Lieut.-Colonel I have set myself to copy, turning up at the right moment with spare horses, to help one of his batteries out of a difficulty.

Hasse's Horse Artillery battery (3 of VII.) from the very first sustained enormous losses. 1st Lieut. von Hoch-Wechter and 2nd Lieut. Hurnann II., were severely wounded. Captain Hasse himself received a slight wound, which however obliged him to give over the command to 2nd Lieut. Hoeckner for a short time only ; all the officers of the battery had horses killed under them. But in spite of the losses both of men and horses which increased from moment to moment, the battery not only bravely held its ground, but also maintained its fire with great effect. Shells were thrown at from 700 to 900 paces against hostile skirmishers in the hollow road, and at 1100 paces against Moscou, as well as at shelter trenches and mitrailleurs east and west of that farm.

¹ p. 199.

Perceiving the desperate situation of the battery, General von Schwartz sent his Adjutant through the storm of bullets with an order for it to withdraw across the defile. But so many horses had already been disabled that the battery could not be moved, and Captain Hasse affirmed that death was preferable to leaving the position unnecessarily. The firing was therefore continued, till at length but one gun could be served, and that by four men only; for all the gunners of the other detachments were either killed or wounded. The ammunition of its own limbers as well as that of a limber of the 4th Light battery was exhausted, and there was no more at hand, the lines of wagons not having been able to pass the defile.

At this moment Major Coester, the Divisional Commander, reached the battery and repeated the order to retire. The Major was with the 2nd Horse Artillery battery (von Hahn) which as we have seen had come under fire at Gravelotte before Hasse's battery, and had not observed the advance of the latter until it was beyond the defile. He then shared the fate of Hahn's battery in being prevented from crossing. Having however received orders from General v. Schwartz to take steps for bringing off Hasse's disabled battery, he now arrived with three wagon teams, which the Adjutant had procured.

Having refitted under fire as far as was absolutely necessary, the battery then retired through the defile, its limbers riddled by bullets, the drivers on foot, the guns drawn by two or four horses and closely packed with the severely wounded. The movement was made at a walk, and further losses were sustained. Major Coester had a horse killed under him; the last gun was suddenly reduced to one horse, and heavily laden with wounded men, was obliged to halt for assistance.

The battery was received at Gravelotte with a loud hurrah, and General von Schwartz embraced the commander with emotion in the presence of the troops. The retreat of this heroic battery was a triumphal march in the real sense of the word.¹

The above examples I had collected among many others for my paper on "Horse Artillery" for the Royal United Service Institution. And though I had not room for them there, it seemed a pity they should not be more known.

The subject of losses and marching forms, as I said before, the two main reasons for the retention of a Horse Artillery division in the Corps Artillery. This elasticity and mobility may some day be tested by our present batteries, as they have been within the last few years by those in foreign armies.

The subject of losses cannot be practised except by falling men and horses out at drill, a poor substitute; yet perhaps one that might be tried usefully, now and again.

Forced marching can, however, often be tried; and the subaltern officer who brought his division in, safe and sound, over a distance where others failed, might stand a better chance, *ceteris paribus* of getting a jacket. It could be often tried at no expense, and as I have demonstrated, at no ultimate damage to the horses.

TABLE OF WORK AND FOOD.

[Appendix II]

Date.	Work done.	Food.				
	Practice work.	Coolty lbs.	Chenna lbs.	Hay lbs.	Grass lbs.	
8th July	12 miles	10	2	—	40	In draught.
9th "	15 "	10	2	—	40	" "
10th "	20 "	10	4	—	60	" "
11th "	2 hours walking exercise	10	4	—	60	" "
12th "	25 miles	10	4	—	60	" "
13th "	28 "	10	4	—	60	" "
14th "	44 "	10	6	20	30	22 miles without gun.
15th "	Exercise 2 hours ...	10	6	20	30	
16th "	42 miles	10	6	20	30	In draught.
17th "	20 "	10	6	25	20	" "
18th "	Exercise 2 hours ...	10	6	25	20	
19th "	20 miles	10	8	25	20	" "

[Appendix III.]

Date.	Hour of Starting.	Miles out from Bangalore.	Miles from last Halt.	No. of Hours work.	Time halted.
1886	5 a.m.				
20th July	...	8	8	...	10 minutes, and watered.
"	...	17½	9½	...	40 minutes, fed and watered.
"	...	26	8½	...	40 minutes, and watered.
"	noon	35	9	7	2½ hours, fed and watered.
"	2.30 p.m.	43	8	...	10 minutes, and watered.
"	4.30 p.m.	47	4	...	40 minutes, fed and watered.
"	...	56	9	...	10 minutes, and watered.
"	8 p.m.	65	9	13	9 hours, fed and watered. (65 miles in 13 hours).
21st July	5 a.m.	74	9	...	10 minutes, and watered.
"	8.15 a.m.	83	9	27½	40 minutes, fed and watered. (82 miles in 27 hours).
"	...	89	6	...	10 minutes, and watered.
"	1.15 p.m.	95	6	32	2 hours, fed and watered. (94 miles in 32 hours).
"	3 p.m.	103	8	...	10 minutes, and watered.
"	...	111	8	...	40 minutes, fed and watered.
"	...	119	8	...	10 minutes, and watered.
"	9 p.m.	125	6	...	8 hours, fed and watered. (125 miles in 40 hours).
22nd July	5 a.m.	133	8	...	10 minutes, and watered.
"	...	141	8	...	40 minutes, fed and watered.
"	...	149	8	...	10 minutes, and watered.
"	noon	156	7	56	3 hours, fed and watered. (156 miles in 55 hours).
"	3 p.m.	163	7	...	10 minutes, and watered.
"	...	173	10	...	40 minutes, fed and watered.
"	9 p.m.	181	8	64	9 hours, fed and watered. (181 miles in 64 hours).

Appendix IV.

Including the lines of wagons, which were in rear, and as much as possible under cover, the strength of the batteries were as follows:—

	Officers.	Men.	Horses.
Horse Artillery Battery	4	150	207
Light Field Battery	4	145	124
Heavy Field Battery	4	151	126
Combatant part, exclusive of lines of Wagons.			
Horse Artillery Battery	4	74	96
Field Battery... ..	4	62	48

7

3

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2

3. 1

79

207

3.1

2.2

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2

WHEEL DRAFT FOR MOUNTAIN GUNS.

BY

CAPTAIN C. T. ROBINSON, R.A.

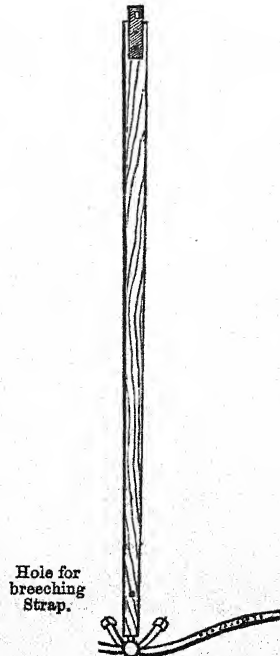
MAJOR ATCHISON in a paper on his experience of Mountain Batteries, mentioned an arrangement, which had been tried by H/4, for taking their 7-pr. mountain guns along roads, &c., on wheels.

Since then, we have, I think, improved on the former idea; and as I have just marched with a division from Pietermaritzburg, a distance of over 140 miles, over a rough hilly country, using the draft system wherever practicable, perhaps our experience may interest other Mountain Battery officers.

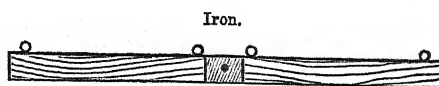
Of course, it is in no way meant to interfere with the ordinary method of carrying mountain guns; but simply as a means of relieving the gun mules when the road is fairly good.

The following arrangement consists of:—

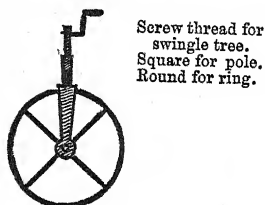
- (1.) A pole about 7 ft. long with a staple and ring and straps attached on one end, and a piece of iron with a square cut hole at the other.



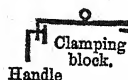
- (2.) A swingle tree 5 ft. long with hole in centre.



- (3.) A wheel and fork—with a pin, which passes through the holes in the pole and swingle tree—the top four inches of the pin is cut with a screw thread, and there is a handle to screw firm.



- (4.) Iron connecting bracket with ring in front; the pin of the wheel passes through this ring, and the bracket is clamped on in front of the trail.



- (5.) Two pair of light traces 6 ft. long with trace hooks at each end.

The total weight being 50 lb.

When not in use this was carried by the relief line; and it took us about three minutes shifting from marching order to pole draught.

The mules were connected to the poles, by the straps at the end of the pole being fastened to the ring in front of the breast harness; the breaching on the inside being also fastened to the front of the pole; but when going down steep hills drag ropes were used.

The wheels were old wheelbarrow wheels; and the entire equipment made in our shops by Farrier-Sergt. Skeet, who invented the idea.

One great advantage, we found, was that it was possible to work mules with sore backs, &c., by using ordinary skeleton harness. I used this arrangement for a least two-thirds of the way, going across country at times, and found the scheme a great success, having only one sore back at the end of the eight days' marching.

If a ring could be let into the rear of the trail, it would lighten the extra weight and simplify the arrangement, but the slight extra weight carried by each of the relief line, is more than compensated for by the long intervals of rest when the gun is travelling on its wheels.

EXPERIMENTS IN DRAUGHT OF MOUNTAIN BATTERIES, AS TRIED BY No. 1 BATTERY, NORTHERN DIV., R.A.

BY

MAJOR C. C. LINDSAY, R.A.

It may interest some of your readers if I give a short account of some experiments in draught tried by No. 1 (Mountain) Northern Division, while on the march from Kalabagh in the Murree Hills to Quetta during the cold weather, 1887-88.

I quite agree with Major de Lantour in thinking that any system of draught which requires an extra equipment is a mistake in India, and that if the establishment of mules is insufficient to carry out a long march on any ground, that Mountain Battery officers should rather agitate for more mules. I think the present establishment is sufficient provided that every mule is up to his work, and that no remounts form part of the establishment. No mule under five years of age should be considered as on the establishment, and any under this age should be attached as remounts, learning their work and be extra to the establishment.

The ammunition mules have as heavy a load as the ordnance mules, and though the load is better distributed they have no relief, as is the case with the ordnance loads.

The 24 barebacks are, or should be, the third relief of the ordnance top loads, and not, as is sometimes the case at present, young remounts.

But though I am against the introduction of draught for Mountain Batteries in India, I admit that occasions may arise of an exceptional character, when the use of draught for a short time may be of great use to a battery—such as having to make a forced march from cantonments, or when proceeding on service where many miles of the route may be on a level metalled road, with the object of finding out what we could do with the regulation equipment of the battery alone.

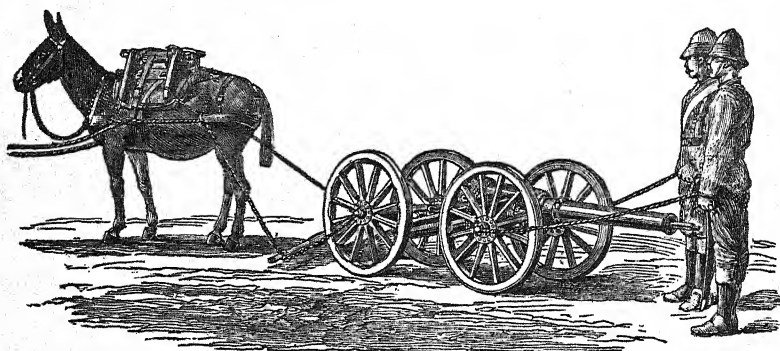
By adapting the equipment as shown in the accompanying sketch, we had one gun per division in draught, and relieved 12 mules of the division of their loads, not counting the two that went tandem in draught.

No stores were used except those belonging to the division.

No. 1 gun was elevated as far as it would go, and the trail was lashed with a head-collar chain passed through the handspike socket in the trail to the axle of No. 2 Sub-division, which with its wheels formed the limber.

Two head chains from the drag washers were fastened to the extremities of a carriage bearer to keep the traces clear of the wheels,

and dragropes as traces were attached, at one end of them, and at the other to the D of the breast harness.



The lead mule was similarly attached to these traces so as to give as straight a draught as possible. Drag ropes were attached to the drag washers of the gun carriage and manned by the detachment as required either to stop the carriage, or to check the pace going down an incline or to assist the draught going up hill.

The road on which these experiments were tried was an unmetalled country road, fairly level for the most part, but often sandy, and frequently sandy beds of streams had to be crossed.

It was found that when the road was sandy the draught was heavy for two mules, and except where the road was quite level and hard the work on the detachments in regulating the pace was harassing. In fact, except when the road was perfectly level and hard, the extra work on the detachments and the mules in draught nearly outweighed the advantage gained by the other mules.

By using the ordinary equipment and putting each gun of a division into draught on alternate days the mules would get a fair share of their legitimate work and keep their backs and girths hard and in good working order.

QUETTA,
August, 1888.

CALCULATION OF THE TRAJECTORY OF THE JUBILEE SHOT FIRED FROM THE 9·2-INCH B.L. WIRE GUN.

BY

LIEUT. A. H. WOLLEY-DOD, R.A.

It has often been questioned whether theoretical calculations of trajectories at very long ranges are reliable, and to answer this, the Ordnance Committee last year decided to fire some rounds from a 9·2-inch B.L. wire gun at 40° elevation. A shot at this elevation and velocity (over 2360 f.s.) naturally excited great interest, and as only one round was expected at first, it was soon christened the "Jubilee Shot."

Calculations of the range were then invited both from gunners and others, and about a dozen results were sent in varying from 16,270 to 20,025 yards or $9\frac{1}{4}$ to $11\frac{1}{2}$ miles, but when the first two rounds were fired in April, ranges were obtained of 21,048 and 21,358 yards, or about 12 miles. This looked discouraging for the calculators, though there were reasons for expecting a longer range, chiefly from the muzzle velocity obtained being 2375 or 15 f.s. greater than was measured at the proof butts, and also from the meteorological conditions which were favorable to a long range, namely a low barometer, fresh favorable wind, and normal temperature.

The calculators were then asked to embody these corrections in their calculations, and it was at the same time decided to fire two more rounds at this elevation, and also two at 30°, 35°, and 45°, besides some at lower elevations. About six solutions of these trajectories were received with much more satisfactory results, which compared favorably with the results obtained at Shoeburyness in July, as the following will show :—

Elevation.	Temperature.	Barometer.	Wind.	Calculated ranges,		Actual ranges,	
				From	To	1st	2nd
°	°	"					
30	44	29·65	L to R, Moderate.	17,500	19,400	17,500	18,344
35	"	"	"	18,900	20,500	19,420	18,936
40	45	30·02	L to R, Light.	20,200	21,400	20,236	20,210
45	62	29·82	Favorable, Moderate.	20,700	21,900	21,800	—

Various methods of calculation were adopted, namely, Bashforth's, Niven's, Siacci's, and a modification of the latter by Mayevski, but none showed a decided superiority.

An outline of the method of Siacci is given below, which it is hoped, may be of some interest, and also of practical use, if not for such excessive ranges, at any rate for solution of problems of up-hill fire over 15° elevation, for which there seems to be no short method of calculation.

The method I adopted for calculation was Siacci's, as described in Ingalls' Exterior Ballistics, in the Library of the R.A. Institution. My first calculation gave range, 20,025 yards; height at vertex, 16,710 feet, and time of flight, 62·3 seconds; but on embodying the alterations above mentioned, I obtained a range of 20,765 yards; height at vertex, 17,111 feet; and time of flight, 63·8 seconds.

The data are as follows :—

Muzzle velocity	...	...	...	...	...	2375 f.s.
Elevation	...	...	...	...	...	40°
Diameter of projectile	...	...	...	...	...	9·15 inches
Weight	"	"	...	...	...	380 lbs.
Barometer	...	...	...	...	...	29·5 inches
Temperature	...	...	...	...	...	55° F.

The tables given by Ingalls being based upon Bashforth's experiments with projectiles with ogival heads struck with a radius of $1\frac{1}{2}$ calibres, the ballistic coefficient $C' \left(= \frac{w}{d^2} \right)$ must have a correction for form of head, as well as for temperature, barometer, and diminution in the density of the air as the projectile rises. The complete expression for C' then becomes $\frac{w}{d^2} \cdot \frac{1}{c} \cdot \frac{\delta'^y}{\delta e^\lambda}$.

Here c is a correction for form of head, and is the ratio between Krupp's and Bashforth's coefficients, which varies with the velocity, and is called the *coefficient of reduction*.

Thus if A be Krupp's coefficient, and A' be Bashforth's, we have for velocities over 1330 f.s.

$$\log A = \bar{4}.11924.$$

$$\log A' = \bar{4}.15253.$$

$$\therefore \log c = \bar{1}.96671.$$

Hence, for velocities greater than 1330 f.s. :—

$$\log \frac{1}{c} = \cdot 03329 \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad 1 (a)$$

Similarly we find that between 1120 and 1330 f.s. :—

$$\log \frac{1}{c} = \cdot 05555 \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad 1 (b)$$

And between 790 and 1120 f.s. :—

$$\log \frac{1}{c} = \cdot 10206 \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad 1 (c)$$

$\frac{\delta'}{\delta}$ embodies corrections for temperature and barometrical pressure, δ' being the standard density of the air at 62° F. and 30 ins. barometer, which is taken at 534.22 grains per cubic foot.

δ is the value at any other temperature t and barometer b , and may be calculated from the formula $\delta = \frac{20.212 b}{1 + .002178 t}$. Now with barometer 29.5, and temperature 55°, we get $\log \delta = 2.72629$ and $\log \delta' = 2.72772$, and therefore $\log \frac{\delta'}{\delta} = .00143 \dots \dots \dots (2)$

Again $e^{\frac{y}{\lambda}}$ is a correction for altitude, the density of the air diminishing as the projectile rises, so that δ becomes $\delta e^{-\frac{y}{\lambda}}$ when y is the mean height of the branch of the trajectory under consideration, and λ is the height of a homogeneous atmosphere of density δ that would exert a pressure equal to that of the actual atmosphere.

Lastly, with the given data we obtain $\log \frac{w}{w_0} = .65694 \dots \dots (3)$

These preliminary calculations being made, we may proceed to the main calculation, which must be done in successive arcs, and the greater the number of arcs, the nearer shall we get to the result, because it will be found that not only does the value of $e^{\frac{y}{\lambda}}$ vary with the altitude in such a manner that to take a mean value of y over a large range would give inaccurate results, at any rate when the inclination of the trajectory exceeds 20°, but the coefficient of reduction varies with the velocity, so that it would be wrong to overstep the points where its value changes, in fact it would probably be better to interpolate the values of $\frac{1}{c}$ between the velocities given in 1 (a), 1 (b), and 1 (c).

The calculation however becomes inconveniently long if we take an arc such that the value of y increases by less than 2000 feet at a time, and the change of inclination of the arc corresponding to this change in the value of y may be easily calculated by Niven's tables, by first assuming a value of D , so as to give a value to y of about 2000 feet, and then by application of the formula for D and S , we find the value of x , and then $\frac{y}{x} = \frac{\tan \phi + \tan \theta}{2}$.

Half the approximate value thus obtained for y (representing the mean height of the trajectory under consideration) is then embodied in the ballistic coefficient, and the calculation made more accurately by Siacci's formulæ. It will be found that so long as the value of y used in the correction of the ballistic coefficient is within 100 feet of its true value, the results are not materially affected.

The following are Siacci's formulæ :—

$$U = \alpha V \cos \phi \quad \dots \quad (4)$$

$$\alpha = \frac{(\phi) - (\theta)}{\tan \phi - \tan \theta} \quad \dots \quad (5)$$

$$\tan \phi - \tan \theta = \frac{\alpha C}{2} \{I(u) - I(U)\} \quad \dots \quad (6)$$

$$x = \frac{C}{\alpha} \{S(u) - S(U)\} \quad \dots \quad (7)$$

$$\frac{y}{x} = \tan \phi - \frac{\alpha C}{2} \left\{ \frac{A(u) - A(U)}{S(u) - S(U)} - I(U) \right\} \quad \dots \quad (8)$$

$$t = C \{T(u) - T(U)\} \quad \dots \quad (9)$$

$$u = \alpha v \cos \theta \quad \dots \quad (10)$$

These formulæ will be seen to differ but slightly from those given by Professor Greenhill, M.A., and Mr. Hadcock, R.A., in their paper on "Siacci's Method of Solving Trajectories," R.A.I. "Proceedings," Vol. XV., page 600, the theoretical explanation of which is to appear in a subsequent paper.

The actual calculation being too long to publish in these papers, an outline of the steps to be followed will perhaps be of assistance to any one who wishes to try the calculation.

We must first ascertain by trial, as explained above, the angle through which the trajectory will turn while the projectile rises about 2000 feet, and it will be found more convenient to keep the *angle* an integral number of degrees than to insist on the *height* risen being exactly 2000 feet, anywhere within 500 feet will be near enough; indeed it is not necessary to keep to any constant number, only as stated before, if the interval is too great, the formulæ fail, if too small, the calculation becomes too laborious, and 2000 feet was suggested as a convenient mean.

In this case it is found approximately by Niven, that a change of inclination of 1° from the commencement of the trajectory, corresponds to a rise of 2350 feet. Embodying *half* this in the ballistic coefficient and recalculating by Siacci, we obtain 2253.7 feet, or just 100 feet less. This second figure will of course be nearer the truth, but to ensure accuracy, the arc should be recalculated, with *half* the new value of y , viz., 2253.7 feet, embodied in the ballistic coefficient.

The final result will be that we get $y = 2250.6$ feet, a difference in this case of only 3.7 feet, which shows that it is unnecessary to recalculate if the second value of y be within 100 feet of its first approximation, but if the difference between the value of y used in

the correction of the ballistic coefficient, and its true value, be more than 100 feet, the results will be materially vitiated.

The steps to be followed then are these :—

a. Calculate change of inclination of arc while projectile rises about 2000 feet. This gives ϕ and θ , and approximately y .

b. Calculate $\log C$ from its value $\log \frac{w}{\bar{d}^3} \cdot \frac{1}{c} \cdot e^{\frac{y}{\lambda}}$ using the value of y from a, but taking half its value as representing the mean height of the arc under calculation.

c. Evaluate $\alpha = \frac{(\phi) - (\theta)}{\tan \phi - \tan \theta}$, with the help of the tables.

d. Evaluate $U = \alpha V \cos \phi$, and from the tables take out $S(U)$, $A(U)$, $I(U)$, and $T(U)$.

e. Calculate $I(u)$ from its value $\frac{2}{\alpha c} (\tan \phi - \tan \theta) + I(U)$, and take out from the tables the corresponding values of $S(u)$, $A(u)$, $T(u)$.

f. Then
$$x = \frac{C}{\alpha} \{S(u) - S(U)\}$$

g.
$$y = x \tan \phi - \frac{x \alpha C}{2} \left\{ \frac{A(u) - A(U)}{S(u) - S(U)} - I(U) \right\}$$

h.
$$t = C \{T(u) - T(U)\}$$

i.
$$v = \frac{u}{\alpha} \sec \theta.$$

v is the velocity at the end of the arc considered, and is of course the initial velocity V , for the next arc which is calculated in exactly the same way, and so on in successive arcs until the velocity has fallen below 1330 f.s., when a different value of $\frac{1}{c}$ must be used, [vide 1 (b)], affecting C . Another change occurs when the velocity falls below 1129, [vide 1 (c)].

After reaching the vertex the only changes in the formula are occasioned by writing $-\phi$ and $-\theta$ for ϕ and θ , affecting (5), (6) and (8).

Some calculators have preferred to work to the point of minimum velocity which occurs 9° after the vertex, but this will be found to make very little difference in the result. The actual minimum velocity will be found to be about 920 f.s.

I append my results in a table, by which it will be seen that it has taken 19 steps to make the calculation. I have preferred not to calculate longer arcs, chiefly on account of the change of the coefficient of reduction, though if this change were constant, a mean value might be taken over a larger arc, thus saving much labour.

	Arc.	Mean y.	log C.	log a.	U.	u.	a.	y.	t.	v.
40-39	40-39	1125	·70923	·11262	2357·9	2137·2	2728·4	2251·6	1·582	2121·9
39-38	39-38	3133	·74065	·10653	2107·4	1957·5	2235·9	1770·8	1·409	1943·7
38-37	38-37	4775	·76624	·10046	1930·3	1820·7	1906·6	1463·7	1·284	1809·0
37-35	37-35	6649	·79553	·09216	1787·5	1635·1	3162·3	2299·1	2·292	1614·4
35-33	35-33	8666	·82708	·08153	1595·5	1493·7	2584·3	1745·8	2·015	1476·2
33-31	33-31	10220	·85132	·07166	1460·1	1386·4	2197·0	1374·7	1·818	1371·1
31-28	31-28	11710	·89686	·06041	1351·1	1275·0	2802·5	1589·0	2·453	1256·5
28-24	28-24	13290	·92154	·04657	1235·0	1169·5	3127·6	1526·3	2·905	1150·0
24-18	24-18	14705	·99140	·03022	1126·3	1073·3	3925·9	1516·2	3·833	1052·7
18-0	18-0	16320	1·01538	·00746	1018·5	950·3	9425·4	1565·4	9·749	934·1
40°-0°	40°-0°	—	—	—	—	—	34095·9	17110·6	29·340	—
0-22	0-22	16120	1·01226	·01139	950·9	893·5	10195·5	—2012·1	11·315	938·7
22-30	22-30	14130	·98117	·04722	970·3	938·9	3967·5	—1933·1	4·625	972·4
30-36	30-36	12125	·94985	·07712	1005·3	973·6	3180·9	—2069·4	3·867	1007·6
36-40	36-40	10210	·91993	·10386	1035·4	1006·0	2258·9	—1767·6	2·819	1033·9
40-44	40-44	8260	·88947	·12943	1067·0	1027·1	2373·3	—2142·8	3·024	1059·9
44-47	44-47	6240	·85791	·15471	1088·7	1049·3	1856·5	—1891·0	2·480	1077·5
47-50	47-50	4215	·82628	·17919	1110·1	1060·3	1911·5	—2162·1	2·674	1091·9
50-52° 20'	50-52° 20' } 2200	79482	·20300	1120·2	1072·8	1518·3	—1887·1	2·220	1100·1	
52°-20'	52°-20' } 620	77009	·22600	1117·2	1086·3	877·5	—1164·7	1·331	1103·2	
53°40'	53°40' } —	—	—	—	—	60·1	—80·7	·092	—	
53°50' (about)	53°50' } —	—	—	—	—	—	—	—	—	
53°40'-53°50'	0-53° 50' }	—	—	—	—	28200·0	—17110·6	34·447	—	

Hence total range = 62295·9 feet.
 max. height = 17110·6 "
 time of flight = 63·787 seconds.
 angle of descent = 53° 50'

The results I obtained by the same method for the lower elevations were at 30°, 18345 yards, and at 35°, 19830 yards.

It is worthy of note that all the calculations except my own (in which I detected a serious numerical error which I had not leisure to correct) gave greater ranges at 45° than at 40°, and this was borne out by experiment, and Professor Greenhill inclines to the theory that the maximum range would be attainable at something over 45°.

It seems therefore to have been amply proved that even at extreme ranges, the formulæ and tables will give correct results, though the actual method adopted depends on the taste of the calculator.

PRÉCIS
AND
TRANSLATIONS.

“MILITARISCHE ZEITSCHRIFT.”

APRIL and MAY, 1888.

THE PRESENT MILITARY POSITION OF ENGLAND.

TRANSLATED BY

CAPTAIN W. P. THRING, R.A.

NOTE BY TRANSLATOR.—I have translated the following Essay at full length, as I think it may interest the readers of the Institution Papers to see an opinion of our present position by a continental writer, and have refrained from making any comments, although many of the author's statements appear exaggerated and some unfounded.—*W.P.T.*

ENGLAND, the Mistress of the Sea, has, in consequence of her insular position, of the interests of her trade, and of her policy, which she has followed for more than 30 years, of not intervening by arms in the affairs of the European Continent, been in the enviable position of being able to avoid much expenditure of money and material of all kinds on her forces. These circumstances have contributed to her national prosperity.

In face of the present important increases in the standing armies, and of the improvements in the art of war, she now finds herself in a state of defencelessness, in the event of a conflict with a neighbour of equal standing; this has disturbed public opinion in England.

Many publications on both sides of the Channel have been published in support of this view, and hence it may be of interest to consider the present state and requirements of the British Army, especially as a considerable agitation for re-organization is making itself felt in that country.

In the following pages a summary of this condition and of these needs is given, with special reference to the most prominent of the above mentioned publications, that of Sir Charles Dilke.

A great proportion of the inhabitants of England live in confidence that the great national wealth and the national courage will protect them from the dangers which their intelligence shows them are imminent, but most educated Englishmen are convinced that an invasion of England is a possible contingency, that England is not in a sufficient state of defence against invasion, and that

invasion would bring with it national ruin. It is not denied that the capture of London would mean the overthrow of Great Britain, and that moreover the weakening of the bond of the Empire, the loss of the coaling stations, the destruction of the English national trade, the payment of heavy war expenses, and internal dissatisfaction which would arise in consequence of greatly increased taxation, would bring about the end of the Empire as at present constituted.

Quite irrespective of the fact that England might have to oppose a coalition of several Great Powers, as for example France and Italy, or France and the United States, well informed persons on that side of the Channel are of opinion that England, at the present moment, is not in a position to fight France single-handed, with confidence as to the result, for although the English fleet is doubtless superior to the French fleet in absolute strength, yet it is possibly no longer so in relative strength, that is to say, if we consider various pressing duties which devolve on it. For in case of war, the English fleet, in consequence of the weakness of the Army would have to perform tasks which do not come in its proper sphere of action.

If Herr von Bunsen's warning in his "German view of Mr. Gladstone" is to be taken literally, England has more to fear than a war with Russia or France. All who are behind the scenes in the theatre of the East know, that, after the refusal of the ratification of the Anglo-Turkish convention regarding Egypt, Germany pressed England to take a more active part in the Eastern complication, because it had the support of Austria and Italy, and that Lord Salisbury, perhaps rightly, but much to Prince Bismarck's disgust, declined, whereupon Austria and Germany last August departed from their understanding, and the latter inclined to the Russian side in the Bulgarian complication. These facts lend weight to Herr von Bunsen's words, when he warns England that by neglecting Bulgaria and leaving the task of looking after Bulgaria to Europe, she will oblige her natural friends and allies to protect themselves, and to abandon her, and that it will be a long time before Australia is strong enough to protect the United Kingdom and India from a Russo-French invasion. England, by her present military organization, which is essentially a defensive one, disposes of only two Army Corps, with which to undertake expeditions abroad. The Volunteers and Indian Army are not adapted for service on the Continent against trained European armies.

Hence England is scarcely in a position to defend Turkey against Russia, and still less to undertake the defence of Bulgaria against Germany or France, nor is she in a position, in case of the constantly possible war with Russia, to make a counter-attack in the Caucasus, as many people in England advise. England is notoriously unready for war, and from the political reserve resulting from this unreadiness, arises danger to the British trade and to peace itself. It is especially probable that, in the meantime, an agreement will be come to between Russia and England, because the state of the Russian-Asiatic railways renders it at present impossible for Russia to attack India under such favorable circumstances as may occur later, and hence delay is in Russia's favor.

With regard to Belgium and Constantinople, public opinion in England has undergone such a change, that people are no longer inclined to defend them. Only in enlightened circles of the English people they do not lose sight of the fact that even if the protection of Belgium and Constantinople is abandoned, yet a policy of disarmament cannot be carried out without great danger in the future. The defence of India, as well as of the English coaling stations and the protection of the English foreign trade must be provided for, and in case of war a certain danger of invasion for the British Isles, and further, what is worse, the paralyzing of the strength of the kingdom by a panic.

At the commencement of this year, when war between France and Germany

appeared probable, the sending a Corps of Observation to Belgium was mooted in English official circles, but it was soon apparent that the government would not press such a proposal, and hence it appears exceedingly improbable that England will in future fight for Belgium.

England with a yearly expenditure of nearly 40 millions on the army at home, in India and the Colonies, arrives at this result, that she can put in the field a body of troops equal in number to the Roumanian army. The British force in India is only sufficient to provide the garrisons for the country without being available for foreign wars, it would be difficult for it to make head against a Russian invasion, especially if this were accompanied by local insurrections as diversions in favour of the Russians. Further, the Afghans might take part with the Russians, and the native troops of the British army might turn against their masters, if their confidence in them is shaken by the approach of the army of a Great Power. The populations of Herat and Afghan-Turkestan might welcome the Russians as liberating them from the Afghan yoke, whilst the armies of the Native States, seduced by Russian intrigues, might rise against the English in their rear.

Ayub Khan has recently escaped from Teheran, where he was kept a prisoner, and it is concluded in England that Russia will make what use she can of him.

With regard to Germany, it is feared in England that the accession of the Crown Prince William to the throne will lead to war. He is there looked upon as a bellicose youth who will probably attack France as soon as he comes to the throne, and perhaps bring on Europe the horrors of a general war. The restoration to health of the present Emperor is earnestly hoped for there on this account.

With regard to Belgium, there are people in England who are of opinion that this country should be defended by England, that its army is inadequate, and that a radical reform of the English military system is therefore so much the more necessary. People believe that England cannot count on any alliances, and are troubled to know whether Turkey and the neutrality of Belgium should be defended, and whether Egypt should be held against France. They are agreed that the United Kingdom, India, further the isolated and small colonies, and finally the coaling stations must be defended. Further, these questions are raised, whether England can defend herself against Russia in India without making any counter-attack, and whether such counter-attack might not be combined with a fight with France, for instance in Tonkin, Tunis or Corsica.

It is authoritatively stated that neither the army nor the navy are in the requisite condition to defend the British Empire and its commerce, and that therefore not only the army but also the navy should be increased, the British fortresses and the fortifications of the coaling stations completed and armed.

The whole discussion on the military questions of the day, even when it touches on the hitherto hidden weak points of the English forces, is carried on with a frankness and openness, which are only possible in a country which at heart is republican, and apparently has been started with a view of giving a sufficient impulse to public opinion, to carry something through Parliament. Sometimes we see great mistakes in military affairs, similar to those of 1866, when it was fully and universally believed in English military circles, that Austria was certain to defeat Prussia in the Bohemian campaign, and again in 1878 when it was generally believed that the Turks would drive the Russians back on the Danube. In the foreground of the discussion is however always the war with Russia, which threatens sooner or later, with regard to which, however, supposing Turkey as an ally, people are agreed on the resulting opinion that England is not in a position to defend Asia Minor against Russia.

As for the particular composition and condition of the British forces, what is particularly wanting is sufficient Field Artillery for home defence, and well

informed people, with reference to the fact that France has 138 field guns with each of her 18 Army Corps (except the Corps in Algiers), put the number of field guns necessary for the defence of England at 900. The French Corps, recently mobilized, were able, five days after the receipt of the order for mobilization, to muster 102 guns each, with teams on a war footing. The foreign field artillery is less expensive than the English, and perhaps, in a very small degree, less fit for service. Just now England is unexpectedly, in spite of the great superiority in numbers of the foreign artillery, about to reduce her Field Artillery, or rather the pearl of it, viz., her Horse Artillery, and is apparently about to depend on the Artillery of her Auxiliary Forces which are not held in much esteem by her own military men. The Volunteer Artillery is deficient in many ways; it is hardly capable of manœuvring and there are not proper arrangements made by which their guns, in case of war, could be horsed: the general opinion in England is, that they would be of more use if they were put under scientifically educated officers and used as Artillery of position.

The English mounted Artillery has been recently reduced and the number of artillery officers diminished, and it is to be feared that there will be a greater need than ever of educated officers, capable of superintending the heavy guns of the Volunteer Artillery, supposing that these are to be generally utilized, and possessing experience in the control of the fire of such heavy guns. In future wars, the preliminary stages will consist of fights between cavalry acting in conjunction with mounted Artillery, and similarly constituted cavalry forces, and since the instruction of both these arms requires considerable time, it is thought in England that these arms in her army are superior to the like arms in foreign short service armies. People in England attach much value to the undoubtedly excellent Horse Artillery, and whilst thinking that on this point they have an advantage over continental armies, forget the diminished effect of this arm in a battle when more than 100,000 men are opposed to each other on one field. In consequence of the less showy appearance of the foreign Artillery and Cavalry, people, except some of the better educated, are disposed to undervalue their performances, and on the other hand they have gone so far as to look upon the more showy English Horse Artillery as a toy and to reduce it, a reduction that in many military circles is considered a great mistake, an opinion that is supported by the fact that even Italy with her limited means has considerably increased her Horse Artillery. England is without doubt considerably behind the Continent, for she has only the same strength of Artillery in permanent service as France keeps up in each Army Corps. In the English Army much value is attached to the smart uniform of the soldier, in order by this means to stimulate recruiting, but the opinion is sometimes expressed that, in place of this, the position of the private soldier should be improved, even if they do not go so far in this direction as in the Russian Army, where they are trying to do away with metal buttons and scabbards.

The Volunteer Field Artillery is intended for the defence of the British Isles in place of the regular artillery, as the latter is to be employed in meeting the requirements of expeditions. In this arrangement lies a serious danger, since the Volunteer Artillery is not nearly equal to the regular Artillery in its fitness for service, and since England, at the moment of invasion, would be entirely stripped of all regular Field Artillery, and would have to meet the enemy with an untrained Militia and Volunteer army, which instead of being in a position to rely for support on a strong and powerful Field Artillery, would have to meet the foe with an imperfectly trained and not very numerically strong Field Artillery.

The official and general opinion in England is the, to a foreigner somewhat surprising one, that the country does not require and is too poor (!) to place a single gun of regular Artillery in the field against a foreign attack. The present reserve of Artillerymen is not sufficient to do more than to bring the existing

Artillery batteries to war strength for foreign service. There is no reserve of horses, but an attempt is being made to form one.

England possesses of regular batteries, enough for two Army Corps, and 14 Field Batteries over, which would however have to be formed into Ammunition Columns. Some people doubt whether a sufficient number of trained men and horses is available to place the batteries of two Army Corps on a war footing. It is moreover a settled thing that, in case of invasion, the defence will be entrusted to the Volunteers and to that part of the Militia which remains over, after Malta and Gibraltar have been supplied with the necessary battalions, and other foreign garrisons have been furnished, and it is quite a chance whether any regular troops will be available to support the Volunteers and Militia.

Now it is evident that, in a Militia and Volunteer army, which moreover will probably have to fight against an adversary who is better armed than it is, the Artillery must be a more important ingredient than in a regular army, and it is further evident that, whilst England should have at least 900 Field guns, or even more since the troops are only partially trained and badly armed, yet, as things now are, she cannot dispose of a single gun, for the Volunteer Field Batteries are not yet formed. The most zealous advocate for the formation of Volunteer Field Batteries on a large scale, to meet this serious want, which is incontestably the weakest point of all the English defences, allows that a sufficient Volunteer Artillery cannot be raised if the men are not paid. A Militia Field Artillery has been proposed, and it is thought that such an Artillery could be raised, which should be equal in efficiency to the present French Field Artillery, but only on condition that the men were well paid. Both Colonel Ray and Colonel Richardson agree that, taking into consideration the class forming the Volunteers, it is only in a few rich districts that a few batteries could be kept up without payment. General Brackenbury in a report states that the whole of the existing Militia Artillery would be required for the defence of the strong places and that a great part of the Volunteer Artillery would be employed in the same way.

Hence it is agreed on both sides, that England possesses no Artillery for defence in the open, that even the guns for this Artillery do not exist, and that during many years whilst England has been making continual preparations against attack, the most important of all her requirements has been overlooked. A well-known prominent English officer, General Brackenbury, gave a lecture recently at the Royal United Service Institution, when he was authorized to give the views of the Intelligence Department. On this occasion he pointed out that, in case of war some regular Infantry would possibly be available and a large force of Militia would certainly be available for defence, but no Field Artillery at all. He reckoned that for the defence of Great Britain alone, 390 Field guns were necessary, being at the rate of 3 guns per 1000 men. Many people will consider this too small a proportion for half trained and badly armed troops, since the foreign armies have from 3 to 4 guns per 1000 men.

The cheapness of Volunteer Artillery led General Brackenbury to vote with Lord Wolseley in favour of the creation of a large force of this kind. In the debate which took place in the House of Lords on this portion of General Brackenbury's lecture, Lord Wolseley mentioned the efficient state of the American Artillery during the war between North and South, when it had been improvised out of the civil population in less than a year. He apparently forgot that the American Artillery on either side was only opposed to Artillery of a similar class, whereas in case of invasion of England, the English Volunteers would have to meet the picked Artillery of a foreign army.

Even in the recent and newest books on the British Army there exist misleading statements, chiefly based on Gathorne Hardy's abortive scheme of 8 British Army Corps with 90 guns per Army Corps, but these 720 guns have never existed; in spite of which this scheme figures yearly in the official plans for mobilization.

In the case of a Russian attack on India, England cannot in the least depend on the thoroughly unreliable troops of the Native States, and the English would far rather take every rifle and cartridge from the troops of the Native Princes (350,000 men), than allow them to march with them against the Russians: moreover the trustworthiness of their own Indian troops is doubtful. During the Afghan campaign, at the Battle of Maiwand, two Bombay Regiments were seized with a panic and the British were obliged to retire before undisciplined Afghan detachments. Numerous marauders from the Indian troops menaced the English line of communications and attacked the posts on those lines in neighbourhoods where the population appeared friendly to the English, and it was some time before this trouble was put an end to.

If, as is considered probable, war with Russia has to be carried on alone and without allies, Vladivostock in Russian Asia is considered the only place on which an English counter-attack could be made, and where Russia is vulnerable for England, and this will only be for a few years until the Russian-Siberian Railway is completed.

Only Russia and France are considered in England as possible enemies, since Germany has no important interests which clash with the English interests, and because Germany is practically invulnerable as far as England is concerned, even if the colonies of New Guinea and those in Africa, which are of very little value to her, are taken away.

Between Italy and England there exists no ground on which differences could arise, and even if they should, England's operations would be sea operations, for it would be the task of the British fleet to separate Sardinia and Sicily from the Italian Empire, although in face of the Italian first class armour-clads and torpedo boats, this will be a difficult task, if the English fleet is at the same time to properly fulfil its other duties. In England, people do not believe in a quarrel with Austria; also although many people think that England, with France and Belgium as allies, will one day have to defend the neutrality of Belgium in a continental war against Germany, yet the majority of the English people, and amongst them some political leaders such as Lord Randolph Churchill, and some leading journals, as the *Standard* and *Morning Post*, are not inclined to fight for the neutrality of Belgium. The defence of Turkey against Russia appears to be the most natural and most appropriate field for the protection of British interests, although Lord Salisbury, as before pointed out, last summer, turned a deaf ear to Prince Bismarck's promptings in this respect.

The chief danger of military operations on a large scale which England might have to meet, comes from Russia and France. It is possible that a French ministry, in accord with Germany, as for instance Ferry's ministry, which took its policy from Berlin, might be in a position to secure the neutrality of Germany in a war between France and England. But what is more probable is an isolated war between Russia and Great Britain, with France in a state of unfriendly neutrality towards England.

There are many Englishmen who do not expect anything from an increased expenditure on the forces, and who are opposed to the idea that the military expenditure can be considerably reduced in consequence of England's keeping aloof from continental complications. This opinion has however become very common in England now-a-days; it is aired in the provincial press, and backed by the colonial interests, and is apparently in a fair way to become the general opinion of the English democracy. It even is represented on the Special Commission, which has recently been sitting on the Army Estimates, and finds continual expression in the speeches of men who have a considerable following both in the House of Commons and in the country. These people are convinced that England, as far as the defence of Great Britain is concerned, can depend entirely on the Navy. Only amongst the better educated part of the population

is the opinion beginning to make way, that England, even with an increased expenditure on the Navy, cannot always keep an overwhelming force in the Channel to oppose the fleet that France can assemble there without any difficulty. This would only be the case if England gave up her position in the Mediterranean, but the British public is not prepared to do this without a struggle. The late General Gordon was certainly an advocate for the cession of the Mediterranean, but other authorities of weight, as for instance Sir Samuel Baker, are of opinion that both roads to India must be held as being essential to England, that England must protect the Suez Canal, keep her footing in Egypt, and hold fast to her possessions in the Mediterranean. England can only follow this policy if her forces are strong enough. The temporary policy which has left the army weak and has not sufficiently strengthened the navy, would apparently lead to the practical result that, in case of war between France and England, Egypt could not be held, although it can be defended in case of war with Russia.

The British public is not prepared to give up either Malta or Gibraltar, but would perhaps exchange the latter for some point on the opposite coast, and both are, under existing circumstances, considered easy to defend. The chances of having Italy as an ally in a future war, and the strength of the Italian fleet are both of sufficient consequence to render it possible for England to maintain the superiority over France in the Mediterranean, and it is certain that England, so long as a large number of competent persons hold to the opinion that the mastery of the Suez Canal is of importance to her, will, in spite of the Radicals, persevere in the endeavour to keep the upper hand in the Mediterranean and on the Suez Canal. On the other hand, it is recognized that neither Malta nor Gibraltar is, under existing circumstances, strong enough, and that Cyprus is still without defence. The weak points of the English preparations for defence are known, but it has not yet been possible to stir up public opinion to insist on the necessary steps being taken to remove them.

In a report of General Alderson's it is pointed out that the weapons with which the British troops are armed will soon be out of date, and that the regular troops and the navy must shortly be provided with a magazine rifle, which will cost nearly one million pounds. The Militia and Volunteers would, in case of war, be equipped with an obsolete weapon, and would be opposed to regular troops armed with magazine rifles. Moreover the regular and auxiliary troops would be wielding weapons which require different kinds of cartridges. If the maxim that for each rifle in the hands of the troops, there should be one ready in reserve, were followed, the carrying it out with a new armament would cost three millions. Then one and a half millions is required for the armament of the English military harbours, that is, the southern fortresses, the Channel Islands, Malta, Gibraltar, Halifax and Bermuda, and a million for the defence of the mercantile ports. Successive Governments have put off bringing this expenditure before the public, but the fact remains that this expenditure is necessary. It is therefore nearly certain that England will enter on the next war with her Mediterranean fortresses in the same hopeless state of unreadiness for defence in which they now are, a circumstance which cannot but increase the difficulty she will experience in keeping up her communications through the Suez Canal.

Even taking the extreme case that England takes no part in anything that happens at Constantinople, that she renounces all share in Egyptian matters, and all claim on the Suez Canal as a roadway in case of war, that she abandons Belgium and Turkey to their fate, and resolves in case of quarrel with any other Power, to limit herself to passive defence, nevertheless she has no guarantee that she will be able to block the French in their ports, whilst she does nothing for her fleet and cripples it in its other duties, viz., defending the coaling stations, the commerce and the small colonial possessions.

And even a policy of this kind would not remove the danger of a war with

Russia. There are many politicians in England who talk of an understanding with Russia, and who think that Russia does not covet anything that England possesses. They argue that India cannot be defended without the co-operation of the natives, and that England, so long as she possesses the full confidence of the natives, has nothing to fear from a Russian invasion. India, however is not a single country, it is a continent inhabited by a large number of races and peoples of all degrees of civilization, of whom some are devoted to the English rule, some are ignorant and indifferent, and some are inclined to be friendly, and all of whom are disposed to fight amongst themselves. With India is connected China, where England has an immense commerce, the loss of which would be a heavy blow to her welfare. It is most important for England to protect her Indian possessions and her China trade. The great exertions that the Russians are making to extend their territories, their patriotism, their courage, their cleverness and their energy, make them dangerous enemies to both.

Even if England left Belgium, Turkey, and Egypt to their fate, and kept herself as far as possible free from continental complications, she would, in case of a war with Russia or France, whilst confiding the home defence to her navy, volunteers, and weak regular forces, not be in a position to defend India and to make a counter-attack in some other part of the world. According to even the most moderate computation of the requirements of the English forces, the Navy must be supported in its task of defending the country by fortified places. A regular organization of the volunteers must be arranged, and they must be provided with artillery, and the other departments of an organized army; all this is necessary to prevent the maritime forces being crippled.

England, quite irrespective of her points of difference with Russia, possesses interests all over the world that may at any moment give rise to a war. The embargo on certain articles of trade on the Chinese coast, like the embargo on paper in France some years ago, which may easily happen again, is one of these; French intrigues in Siam may also cause a war. The English colony in New-foundland may at any moment rise against the mother country, or originate a war with France. Not long ago, England in the matter of New Guinea, yielded in a way that public opinion would not brook, and which led to the ruin of Lord Derby's political position. England gave way to Germany in Zanzibar, and lost her influence in that quarter, and in consequence of this she also lost her trade there. A conflict between England and the United States is moreover not impossible.

Many people say that England's task will be an easy one, if she confines herself to the defence of her own possessions. But this defence will entail many conflicts under different circumstances. For instance, no one in England doubts that the Channel Islands would have to be defended. But it is by no means easy, even with a superiority in ships, to defend both these Islands and the south coast of England.

With regard to Russia, the opinion was recently expressed in an English military journal, that Russia, on account of the state of her finances could not carry on a war, the fact that Russia in the last 20 years has doubled her national income and taxes, as well as her expenditure, and is more prosperous than she was 20 years ago, being lost sight of. The decision that Russia has recently arrived at, to commence the construction of her Trans-Siberian Railway, affords a singular contrast to this conclusion. This is the most costly undertaking that any Power has ever entered on, and its completion will render Russia invulnerable as far as England is concerned. Signs were recently visible in France, which shewed England that it was possible that France, either with or without a Russian alliance, might some day put up with the loss of Alsace, in order to direct her attention first on Siam and then on China, with the hope of finding in those lands an Indian Empire more wonderful than the British one. Voices are also heard

in France suggesting that Alsace may some day be regained by an exchange in which England will suffer. An anti-English policy would be very popular in France, where the English are even less popular than the Germans. A very ably written pamphlet from the pen of a French officer was recently published in Paris, entitled "England in the Mediterranean," and in this pamphlet the policy of friendship with Germany and attack on England was advocated. Another work on the same subject which has recently appeared has excited more attention. This described the overthrow of England by a French Army Corps, for from a French point of view, the mobilization of only four of their 19 Army Corps was considered necessary, after the English expeditionary troops had been diverted to Egypt and the English fleet had been divided. It has been stated that this last work was paid for by Germany. It is besides the opinion of many military men in all countries, that England would be defeated by France in case of war.

Two French *brochures* dated 1885 and 1887, on the state of the English Navy, point out the capability of England to render her forces equal to her needs, but they at the same time show the present weakness of the English Navy, considering the duties it would have to perform in war. They also point out the superiority of the French Navy in guns. Some sentences in these *brochures* criticise with severity the condition of the English forces, as for example the following: "In times of danger, a German, a Frenchman, a Russian, considers it his unalienable right and an honor, which nothing on earth would induce him to forego, to have a place amongst the defenders of his country, but in England, to become a soldier is considered folly. The Englishman's passion is money; he expends it to procure soldiers, and calls an assembly of these soldiers an army: but such an army is only for times of peace. Carthage also possessed unlimited means and an unrivalled fleet."

After the fleet, the volunteers are the chief means of defence of the British soil, and they, according to the opinion of some of the best men amongst them, as for instance Captain Wilkinson, are not in a condition to measure themselves against the regular troops of foreign armies, and beyond doubt they would have to do so in case of a great war, for such would hardly come to an end without an attempt at invasion. It is clear that the invaders, if they succeed in landing on the south coast, will take London as their objective. The above-named volunteer officer advises therefore the preparation beforehand of a properly trained army of the three Arms; he opposes the reduction of the regular artillery, and urges that more attention should be paid to fortifications; he points out that the English volunteers, although they know their own value, do not presume to undervalue the experience of the regular troops. People in England still believe in the warlike spirit of the nation, and believe that the material is excellent and that it is only its employment that is bad.

The economists however, with Lord Randolph Churchill at their head, will not hear of an increased admission of this material in the present *cadres*, and find themselves opposed to the opinions of the other authorities, such as Lord Wolesley, Sir Frederic Roberts, and General Brackenbury. People in England at the present time, with war clouds threatening in all directions, are afraid to undertake a complete reorganization of the system, but probably without reason; for the confusion which would exist in England in military matters if war broke out, would not be increased if a reformation of the system were now commenced and war broke out shortly. The English War Office at all events is overburdened by excessive centralization.

The English Army Administration has for years had to carry out continued changes. An attempt has been made to bring in short service, and this has considerably increased the expenditure on Indian forces. Then, too, a territorial

system, called in England localization, has been tried. Nevertheless there is no real territorial system and no real reserve, as these words are understood on the continent; for England possesses no reserve which is kept in training, and her reserves are simply lists of men who have been soldiers and who can be called out in case of need. Although England has destroyed her old long service army of well seasoned men, she has not adopted short service in the modern sense of the word. She possesses an army which is very weak in numbers and which, according to the theory of its organization, should be the most perfect in the world, but it is notoriously behind the armies of the other Great Powers, both in armament and equipment; and whilst the weak strength of the army and the want of reserves render the task of mobilisation easy, yet the English arrangements for mobilization do not nearly come up to the continental arrangements, and the English Army would require much more time for its mobilization than the army of any Great Power on the continent.

The expenditure for the proportionately small British force is excessive, and yet does not obviate the necessity for great further expenditure in case of war. The English fleet is too weak for its duties and is not sufficiently protected against the modern appliances for destroying ships. England is behind the other Powers with her heavy guns for coast defence, her disappearing guns, her armoured cupolas and defences and her torpedo defences. The country lies open to an invasion, to the bombardment and burning of its commercial harbours, and is liable to have its arsenals bombarded and to suffer the loss of its coaling stations and to have its commerce destroyed. England expects her fleet to take the place of both fortifications and of the field army. She has no organization for the defence of the mother country, her reserve of men is no real reserve, she has no reserve of horses and cannot at once mobilize the two Army Corps destined for foreign expeditions, for want of this reserve of horses. Her Field Artillery is quite insufficient, military stores of all kinds, guns and ammunition are wanting, both in the mother country and in Canada, which is apparently as badly provided for defences as the mother country. The English Artillery of position is too weak, and the colonies can only obtain their artillery and ammunition from England, and their requirements would add considerably to the sudden pressure under which the overburdened War Office would inevitably break down in case of war.

In India the English troops are only in sufficient force to furnish the garrisons, whilst the native troops are not fit to meet the Russians in the field. The English settlement with Russia regarding Afghanistan is of no value. England has every year lost ground in Afghanistan to Russia, and the latter has continually increased her forces for attack in that quarter.

As regards the financial side it appears that the defence of India is being sacrificed to England, and that India only possesses depôts for her own interior requirements, and is in a fair way to be ruined through the demands for money made on her in accordance with a system which does not meet her requirements. India requires long service, and England in Europe short service and strong reserves, and a compromise has been arrived at which does not benefit either party. Squandering and complication reign supreme in the military administration of England and cause it to contrast unfavourably with the scientific system of modern continental armies. The system on which the English army should be based in future has been the subject of continual parliamentary enquiries, carried on by innumerable committees and commissions. Among the armies of the other European Powers, that of Russia is entirely free from parliamentary interference, and those of Austria and Germany are practically free, whilst the Italian parliament, whatever might be the state of the Italian finances, has year by year voted whatever was asked for by the last two distinguished War Ministers, who advised the doubling of the Artillery and an increase in the

strength and improvement in the equipment of the other Arms. Last year the Italian Army was increased by 48 batteries of six guns each, and the German Army was similarly increased. In the French Parliament there exists a strict control over the details of the military organization, which however does not prevent competent persons, who are responsible for the organization, being entrusted with very full powers. The Chief Council of War was constituted three months ago with eleven members, of whom nine, as all military men owned, were amongst the best officers of the French Army, viz., the War Minister, the Chief of the Staff, and further Generals Saussier, Février, Billot, de Miribal, Luval, Wolff, and de Gallifet, the others were Generals Carrey du Bellemare and Brusonet. In contrast with the well ordered state of affairs which prevails on the continent with regard to these matters, England presents a state of complete disorder. These military affairs are temporarily in the hands of single individuals, as the Duke of Cambridge and Lord Wolseley, whose ideas notoriously do not agree on all points, and Sir Frederic Roberts, the Commander-in-Chief in India, who on many points differs from both.

Whilst the large armies of the continental Powers have on an average about 18 Army Corps on a peace footing, England can at this moment, with difficulty, put two Army Corps in India and one at home; and this can only be done if the Indian garrisons, which Sir Frederic Roberts considers essential, are given up, or else the Army Corps are made up with native troops, whose value in the field is doubtful.

No steps are taken in England towards holding in readiness a sufficient stock of war material of all kinds. It is certain that men like Lord Wolseley and Sir Frederic Roberts know how to value a state of readiness for war, such as exists on the Continent (especially in Germany and France), down to the least details, but the English habit, of keeping up quite inadequate provision of stores in peace time, is too strong to be overcome. In England, even the maxim, that every one who has to fill any post in war time, should be instructed in its duties in time of peace, is not carried out.

It is certain there are plenty of men in England who have completely mastered the principles of thorough Army Organization and who are capable of carrying it through; as for instance Sir Frederic Roberts, who has done it in India, as far as the English troops are concerned, and Lord Wolseley, whose organizations in each of his expeditions have been most careful and energetic and in every respect excellent, and who, in his "Soldier's Pocket-Book," has written one of the best Hand-books extant on the elements of the art of war. Only the men of the ruling system in England will not take the necessary steps.

People in England are beginning to understand what is the minimum of the military requirements that must be attended to, and as such point out, that England must be prepared to defend the United Kingdom and India. England must defend India against Russia, and at the same time be able to make a counter-attack on that Power; should have the power to defend her coaling stations against France, to beat off an invasion, and to prevent an attempted invasion causing a panic. By panic we mean here a confusion which leads to improper military measures. For instance, in the case of England, supposing France in case of war, has concentrated a strong force of troops at Brest or any other port on the channel, and has prepared a fleet there, similar to the Boulogne fleet of Napoleon I., England would be protected by her fleet from surprise, and a landing could only take place after a fight at sea had been decided; if however, in consideration of the weakness of the forces for land defence, a panic took place in London, it would necessitate the concentration of the whole English fleet in the channel, the giving up of her interests in the Mediterranean, and what is worse, would leave her coaling stations all over the world, on which the protection of her trade depends, open to a French attack.

There are few naval officers who are of opinion that the English fleet is strong enough to meet the fleets of all probable enemies, and, considering recent inventions, to ensure the mastery of the sea in time of war. There are none who do not maintain that, to do this, the Navy must be entirely free to carry out its own task and that its harbours and coaling stations must be defended for it and not by it. As matters now are, the large mercantile harbours of England are entirely defenceless, and as far as the coaling stations are concerned, England has not yet provided the necessary guns. Many naval officers believe in the supposition that, in case of war with France, the fleet will be expected to defend London, that London will be fortified at a cost of several millions, and there is hardly a naval man who is not of opinion that either this step or a strengthened defence of the coast or near the coast is necessary. Only very few of the more enlightened politicians incline to the opinion that the expenditure of from 3 to 5 million pounds on the fortification of points round London is an expenditure which, considering the importance of the interests involved, would recommend itself in connection with a re-organization of the English forces. It would assure England against the panic which is to be feared in case of war, for it deprives the foe of the chance of bringing the war to a sudden conclusion by surprising London, if he has previously obtained the mastery in the Channel. If England fortifies London, an invasion becomes an undertaking the chances of which are not in proportion to the risks. Considering the exceedingly fatal results which the capture of London by an enemy would have, the demand for it to be fortified appears well grounded.

The Volunteers, whom England, unless she gives them an entirely different organization from the present one, cannot expect to meet an equal number of foreign regular troops in the field, would render excellent service in the defence of even partially fortified places. The circumference of London is so great that, if fortified, London could not be surrounded.

England, in case of an invasion, would require above all things to gain time, and if she fortifies her Capital and can so protect her arsenals and factories that the enemy has no chance of capturing them by a sudden attack, she will gain the necessary time to give the development of her great defensive power space to act.

There are some naval officers, like Admiral Freemantle, who are opposed to the fortification of London, but who, in common with those who hold the opposite opinion, are convinced that Great Britain's state of preparation for defence is absolutely bad; but who would prefer to see the money which some would devote to fortification, expended on the organization of the troops. It is quite right that the organization of the troops for the defence of England should stand in the first place, that a Field Artillery should be formed, that the troops should be provided with superior and not old-fashioned weapons, and that the military system should be transformed, but in spite of all this the fortification of London seems most important. Things might have gone quite differently for France, who in 1870 possessed a fine army, which however was too weak in numbers, if she had, prior to 1870, expended half the sum on fortifications that she has spent on them since that date.

It is proposed in England, if, as appears probable, the fortification of London is not carried out, to at any rate protect Woolwich against a sudden attack, and apparently the same would be done for the second arsenal, whose erection in the interior of England has been long planned. The question of fortifying London has also been considered from a financial point of view, and the property in London has been valued at more than a thousand million pounds, and it has been pointed out, that the expenditure for Field Artillery, for a repeating rifle and for fortifications would not represent any very high percentage on the sum to be insured, for the capture of the capital would mean more than the loss of a

thousand million pounds, since it would bring with it the ruin of the Empire and the complete overthrow of English commerce.

The wide extent of the English empire, the large number of its inhabitants, the rapid growth of its Australian and American colonies; all these afford no protection against the danger incurred by the fact that the heart of the Empire lies open to attack. In a certain sense the great extent of the Empire is a weakness. British North America without contributing any defensive strength for her own or England's defence, may make heavy and sudden demands for assistance. The completion of the Canadian Pacific railway has recently evoked great satisfaction in Parliament. It is true that this railway, which runs across the American Continent on British soil, may be of great value to the British Empire, but in a military point of view much reliance cannot be placed upon it, for it lies close to the frontier of a possible enemy, and even if the friendship of the United States Government can be secured, there are points between Halifax and the Upper Provinces, where a few raiders, hostile to England, could easily destroy the line, and there are several places where the breaking of the bridges is possible and under any circumstances very difficult to prevent.

Similar weak unprotected points are to be found in many parts of the wide British empire.

As already stated, people in England are now endeavouring to ascertain what is the minimum development of military strength that is absolutely necessary for the country, in order to be able to found a re-organization of the forces on it.

Parliament has recently accepted the statements of successive War Ministers, that the coaling stations must be defended, and that, moreover, England must be in a position to defend herself in India and at home, and to be able, in case of need, to send in addition two Army Corps abroad as an expedition.

On this basis England is about to endeavour to base a re-organization of her forces.

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LETTERS ON INFANTRY,

BY

PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

TRANSLATED BY

MAJOR N. L. WALFORD, R.A.

1st Letter.

CONCERNING THE GOOD QUALITIES AND THE IMPERFECTIONS OF OUR INFANTRY.

ON reading of the exploits of the German infantry in the war of 1870-71, one comes to the conclusion, not only that it is the most perfect infantry which has yet been seen, but also that no more perfect infantry can be imagined. What though the emperor Napoleon said, after the catastrophe of Sedan, that the German successes were due to the Prussian Ulans and the Prussian artillery, while Bazaine expresses himself in the same sense in his "Episodes." The German cavalry undoubtedly blindfolded the eyes of the enemy, and secured for its own army the most perfect freedom of action. Again the artillery certainly was compelled often, and with success, to assume the rôle of its infantry, when our needle-guns were not as yet able to answer at long ranges to the French Chassepôt. But after all the infantry have always done the greater part of the work. Such deeds as the storming of the Geissberg at Weissenburg, of the Rothe-Berg at Spicheren, of Fröschweiler at Wörth, the advance of the infantry almost into the line of the forts at Colombey-Nouilly, the stubbornness of the infantry against the three-fold numerical strength of the enemy at Vionville-Mars la Tour (where they finally retained possession of the field), and the storming of St. Privat, are heroic deeds, of which the honour rests with the infantry alone. This honour is increased ten-fold by the fact that the weapon of the German infantry was a poor one compared with that of the French, and had not nearly the same range as the latter. It might indeed be objected, that the German Staff had so arranged matters that at all these battles, except at Vionville-Mars la Tour, they had a numerical superiority at the decisive point. But nowhere was this superiority large enough to make up for the triple range of the enemy's weapons. For the French Chassepôt inflicted sensible losses on us at 2000 paces, while the sighting of the needle-gun did not permit of its being used with effect beyond 600 paces. Thus our infantry had to cross a space of 1400 paces, suffering ever increasing loss, before it could defend itself, while in all these battles it assumed the offensive against prepared, and often fortified, positions of the enemy.

But in the later campaigns of the war the Germans very soon ceased to possess this numerical superiority. The army which was set in

movement against Châlons, and whose operations ended with the victory of Sedan, was even at that date only 25,000 men stronger than the force (including that of Vinoy), which MacMahon commanded; and when the investment of Paris had begun, and fresh improvised armies were arising all around, the Germans were as a rule obliged to engage them with a strength from one-half to one-third of that of the enemy. Thus Prince Frederic Charles in the beginning of January moved with 58,097 infantry, and 16,360 horses (having with artillery and pioneers a little over 80,000 combatants); against Chanzy, whose army was estimated at 250,000 men. If the situation of the Germans in France at the beginning of January, 1871, were placed as a theoretical problem before a competent military critic, who had no knowledge of the war of 1870-71, but had been informed, of the relative numbers of the combatants, and also that the weapon of the French infantry had three times the range of that of the German, he would consider it as simple madness to attempt to continue the siege of Paris, and to hold at bay the enormous relieving armies. But nevertheless this was done, and with the greatest success, and was not madness at all. The victories, which the German troops won everywhere, forced from our great taciturn strategist the exclamation; "What brave troops! Send them where you will, they are always victorious!" Even if it be taken into consideration that almost all the enemy's troops were newly raised, and had not yet learnt to shoot well, yet we on the other hand know from the experience, which we have gained from many experiments and much practice with long-range arms, that at the very long distances, up to 1600 metres or 2000 paces, there is not much difference in the per-centage of hits of good and bad shots, so long as the sight is properly raised; trained men cannot reckon on a large per-centage at such long ranges. The full development of the shooting of single marksmen does not gain its entire value until the time of the decisive fight, when they can aim at individual men of the enemy, that is to say at 450 or 550 yards or less. Now every man of the huge masses of newly raised infantry of the enemy had a long range rifle and with it threw bullets into our ranks; our infantry had need then of almost as much energy to hold their ground, and even to advance, under the long-range fire of these double and triple masses, as if this fire had been delivered by trained marksmen.

The more the details of the actions of this war are studied, the greater will be our admiration of the deeds of our infantry, though this admiration cannot excel that which was felt by those who witnessed them at the time. Thus the question presents itself; "in what did the superiority of our infantry over that of the French consist?" For we cannot with certainty assert that a German is by nature braver than a Frenchman. The peculiarities of character of the two nations certainly differ, but the French have ever been held to be brave men, and their superiority over the Germans in making use of the character of the ground has been always from long ago acknowledged. Napoleon I. showed of what grand deeds the French soldier is capable; Sebastopol and Solferino had obtained for the French army of the second half of our century the reputation of invincibility, and all those who in 1870 were engaged against the old French army, before it disappeared from the scene, learnt to feel how well and stoutly they fought.

This question was asked everywhere; and after our last war missions from every army streamed into Germany, to study our organization and to search for the causes of this superiority.

It would have been most natural, if our infantry had believed itself to be at the zenith of all perfection and had held fixedly to its organization.

But on the contrary we saw with astonishment that our infantry felt the necessity of improving itself in all directions. They were not contented with demanding an arm, which should possess every technical improvement, but they also attacked the existing regulations, as being no longer appropriate. The most varied proposals were made. Who does not remember the numerous, some marvellous but most of them very good, formations for action, which were tried experimentally on the Tempelhof plain near Berlin.

The authorities also shared the opinion as to the necessity for changes in the regulations ; a committee was assembled to revise the regulations, and on the 1st of March, 1876, appeared a revision of the infantry field-exercise of 1847, as a new edition, containing the changes adopted up to the 1st of March, 1876. Wonderful ! It is felt necessary, after such unheard of successes, to change the principles of tactics ! Involuntarily the question is asked ; "What was wrong ? Why these changes. What has happened ?"

If we look at the statistical pages of the official account of the war, and compare certain figures, we shall find ; "The Guard-Corps lost in the battle of St. Privat 307 officers, 7923 men, and 420 horses, and at Sedan 25 officers, 424 men, and 190 horses ; and yet had certainly no smaller share in the success of the latter battle than it had in that of the former.

The III. army-corps lost in the battle of Vionville-Mars la Tour 310 officers, 6641 men, and 677 horses, while the whole army of Prince Frederic Charles, four army-corps strong (of which the III. was one), and including several cavalry divisions, lost from the 4th to the 31st of January, 1871, in almost daily actions, among which was the three-days' battle of Le Mans, 229 officers, 3721 men, and 426 horses, about one-half of the loss of the 3rd corps at Vionville. The X. army-corps, which took an important part in these battles and actions, lost at Vionville-Mars la Tour 202 officers, 4945 men, and 365 horses, or more than the whole losses of the II. army in the whole of the month of January, 1871."

I do not wish to fatigue you with figures, or else I am in a position to prove the same fact with reference to every body of troops, namely, that they suffered colossal losses in the first encounters with the enemy, and later on obtained equally important results with smaller proportional loss.

The simple, incontestable, and logical conclusion is, that some faults must have been committed in the earlier actions, which led to unnecessary losses, and which were at a later date avoided, after that the consequences of them had been painfully realised. These faults were due to no particular individuals, and entail no reproach to any one person, for they were universal and common to all ; they were present in the system and in the principles followed ; thence sprang after the war the universal feeling of the need for a change in the principles and also the numerous proposals made as to the form of the change.

It is impossible to deny that we were surprised by the long range of the Chassepôt, and at first everywhere marched, without foreboding, in close columns into the zone of this fire, in a real belief that we had plenty of time before we need break up into smaller units. This we

naturally did not do in the next action. But this was not the only cause of our heavy losses in the earlier combats, losses which we were able to lessen in the later battles.

We, in addition, adopted formations for fighting in which our loss was less, leaving out of the question the fact that we avoided by reason of the universal and general familiarity with war many losses which novices must necessarily incur.

After the first great battles, with their excessive losses, new formations for fight were adopted and practised. These, based as they were on sad experience, withstood practical proof. I remember a very remarkable example of this. During an attack on a village, at a late period of the war, two regiments occupied that part of the edge of the village which had been allotted to them almost without loss, while two others again suffered enormous loss. The reason was that the two last mentioned regiments were commanded by officers who had been wounded at St. Privat and having re-joined the force only on the day before this action, had not yet taken any part in the practice of the new formations. They fought in the old style, as they had been taught, in company-columns, and again suffered colossal losses. Both these brave men were among the killed.

But the habit of war, the being "aguerri," also diminishes the losses. Anyone who does not know practically what this means imagines (at least, this was my case), that the habit of war is synonymous with hardening, and with indifference to all the toils and dangers of war. It is altogether the contrary! Men who, living in a certain amount of ease, comfort and effeminacy, have arrived at the age of 20, 30, 40 or 50 years, cannot in a few months so harden themselves that they can give all this up and expose themselves to cold, &c., without danger to their health and life. The habit of war consists in learning to procure for one's self, without increasing one's baggage to a degree which could not be permitted, that which is absolutely necessary, considering one's rank, station and habit of life, that is to say necessities which have grown to be so in one's earlier days; in guarding oneself as much as possible from the effects of bad weather; and in avoiding in action all loss which is not absolutely called for by the object of the fight or by honour. This is even a duty. For the man who allows himself to be killed out of carelessness or bravado, when his death is unnecessary, does a wrong to his fatherland, which he thus uselessly deprives of a soldier.

Again we find, if we carefully compare the action of our infantry at the beginning of, and at the later periods of, the campaign, certain customs and habits which led to great loss and which were later on abandoned. These habits and customs, which are the result of a long peace, will always take root again, if attention be not constantly drawn to the fact that things cannot go on so on active service.

It is well worth the trouble to search out, down to the smallest detail, what constituted these faults, which were committed and were later on avoided, and as to what were the good qualities of our infantry, which, in spite of these faults and in spite of the enormously superior arm of the enemy, secured such grand results.

In making this search I shall not be able to refrain from here and there expressing a wish that this or the other might be improved. You will perhaps find it presumptuous that I, a gunner by profession, should criticize so excellent an infantry and dare to offer it advice. But

criticism of, and advice to, infantry has been during seven years my duty as commanding a division. Moreover in the first year of my command I industriously attended the recruits' drill; I was annually present at all inspections of recruits of an entire brigade, at the company-training of at least three regiments, and at the battalion-training of the whole division. I can thus, assisted by what I have seen in war (and including battles and sieges I have been on 60 different days under the fire of the enemy), form a confident judgment with regard to infantry, and one the more impartial and the more unbiassed that it cannot be clouded by old habits. Far be it from me to undervalue tradition. Tradition is founded on old experiences, but he who follows the tradition knows nothing of these experiences. The great mass of people continue to do what they have always done, and ordinary men follow gladly the dear track of habit. Since however the experiences have been forgotten which formed the basis for the tradition which everyone follows, he who breaks with the tradition is in danger of destroying one based on good grounds, and may later on have to renew the old experiences in some unpleasant manner, and then to recall the old tradition, if there is yet time. For many things it will then be too late, especially for such as have to do with discipline. And when the discipline of an infantry is slackened, then, alas! good-bye to all great successes! I can therefore only recognize the deep wisdom with which those in high authority interfere only very slowly and gradually with whatever is rendered sacred by custom.

But there exist traditions which arise from the experiences of a time when we fought with quite other tactics. Line-tactics, in which soldiers were used only as machines, in which the infantryman was only food for powder, in which a private was more afraid of a blow with a stick than he was of a bullet, these tactics must beget customs and habits, which can in these days bear no good fruit. And yet, because that time was full of glory, we still have, at least in a part of the army, not perhaps regulations, but traditions, with which we might easily dispense.

Again traditions grow out of the conditions which obtain in peace when to work up for inspections and manœuvres, is regarded as the supreme object of effort. This ought not to be, but it is so, and finds its origin deep in human nature. The man who is the very best soldier in the field, if in peace he is constantly getting into trouble, must arouse in his superiors a suspicion that he has fallen from his former efficiency, and is no longer what he was. He also must therefore, if he wishes to continue to serve, work up for inspection, &c. Such traditions we ought to fight against with all our might; we must not allow them to spring up, and when we come across them must throw them utterly aside, so that at inspections we may demand before all other things only that which is truly useful; but that must be rigid, exact, as rigid and exact as possible. It is also the duty of inspectors to so direct their inspections that it may be impossible merely to "work up" for them.

I will now relate to you, as an example, one single tradition, which I came across when I commanded a regiment. I discovered, when I saw the recruits drilling in ragged clothing, that the batteries drilled their recruits in the winter in tunics and trousers which has been condemned and had been handed over to them as material for repairs. I forbade this by a regimental order. A captain of a battery, who had been long on the most intimate terms with me, said to me confidentially in private; "You have given me an order which I shall oppose; if I obey it and

the other captains do not, I shall wear out my clothing and they will keep their's new; then at the inspection I shall be blamed and they will be praised. We shall all therefore, when you are not there to see, drill our recruits in condemned clothing." "What will you do," said I, "if I have the clothing unpicked?" "Then we shall tell the company-tailors to make them up again." "But suppose," said I, "that I give you only half trousers and half tunics?" After thinking a moment he said, "We should be done there."

This was done. From that time when the batteries wanted to condemn 10 tunics and 10 pairs of trousers as material for repairs, they had to return these articles into store, and then received from the quarter-master, one 20 right legs of trousers and 20 right halves of tunics, another the corresponding left arms and legs. The appearance of the regiment was thus much improved.

You will perhaps laugh at such details. But the grandest and the most beautiful building is composed of comparatively small and unimportant stones, and falls altogether to the ground, if these little stones are not worked and joined with proper care.

In my proposed examination into the good qualities and the failings of our infantry, I shall begin quite from the bottom, from the very smallest stones. If this is likely to weary you, then withdraw your request that I should write to you on my opinion of the infantry, and for my part I will cease to write.

2nd Letter.

MARCHING AND GYMNASTIC EXERCISES.

As you say that you will not be wearied by my examination into details, I will continue my letters. But in order not to try your patience too much at once, I will begin by telling you a tale of an episode in my life. In the summer of 1864 I received command of a regiment. In the autumn my first recruits arrived. The whole barracks were soon full of such figures as would make you die of laughter, such that the most exaggerated caricatures of the* "*Fliegende Blätter*" would give but a faint idea of them. The awkward fellows, whose neglected carriage made them look like a set of ill-made images, tried hard but in vain to stand straight; some broad-shouldered yokels still wore their peasants clothes, while tunics to fit them were being made, and tumbled about as they fruitlessly tried to master the balance step; some with exceptionally large heads, which none of the forage caps in store would fit, still wore, as the cap-maker had not finished his task, the shabby tall hats in which they arrived; these occasionally fell off and rolled across the barrack square; the whole motley company blundered together over their positions, facings and wheelings.

In the same barracks were quartered two companies of infantry of the Alexander regiment of the Guard. During the first week after the arrival of the recruits not a single man of this regiment was to be seen in the barrack square. At the end of the week I saw the first of the infantry recruits, and then only a very small squad, drilling in the square. They already marched so well, that I thought they were a detachment of the men of the previous year. But on asking Captain von W., who commanded the company, he told me that they were recruits. I expressed my astonishment. He told me quite openly that he was no less astonished that my batteries began to drill their recruits on the very first day, before even they had got their clothing; he allowed no man to begin to drill, unless he could drill. This seemed to me almost as if no one was allowed to go into the water before he could swim. But the result spoke so strongly in favour of Captain von W.'s plan, that at my request he informed me as to his principle.

He explained to me that every man of the lower classes uses only one set of muscles in his ordinary work; the shoemaker uses one set, the tailor another, the woodcutter another, and the agricultural labourer another; the muscles which are least used tend to grow feeble from disuse, and this is why newly joined recruits (in nine cases out of ten) find it hard, and almost impossible, either to stand or to walk straight. They may be compelled to do so, but not without pain, which not unfrequently increases into cramp of the muscles, and this, in combination with all the new and unaccustomed things which the recruit finds in his new position, in combination also with home-sickness, leads to despondency and not rarely to insubordination, crime, and even suicide. For this reason it has become a tradition in the infantry of the Guard to instruct the recruits first of all in every kind of

gymnastic exercises, which are carried on in canvas suits in the barrack room, and which advance very gradually and without effort from the easy to the more difficult, until they at length have command over all their muscles. Since these exercises are tiring, they are not carried on for too long together, but are varied by instruction as to their new position, by showing them their arms, &c., and especially in encouraging them to ask questions, by awaking their curiosity, in order that they may gain confidence in their new position and in their superiors. The results of these exercises are soon evident in the development of the neglected muscles, which shows itself by a natural and more upright bearing and by a regular step. When this result has been obtained, they then for the first time receive their uniform, which the tailor has been fitting in the meanwhile, and commence their drill. Each man is, according to his progress, posted from time to time to the drill-squad.

I asked him whether the infantry of the Guard had any written instructions with regard to this practice, which he could lend me. The Captain answered that all this was simply a tradition which had gradually grown up, but that he would ask his officer who was in charge of the recruits to write it out for me; it would be very excellent practice for him, and I should have it after he had himself corrected it. He did so; but since there were many things in it peculiar to the infantry, I asked two of the Captains of my batteries to work it out into a regulation fitted for the artillery. I found that these two officers agreed with me as to its value, but they were in the minority, for most of the officers preferred to go on in the old style, saying that this was all very well for the infantry, but that artillery had no time for such trifles.

After this system had been worked out, I made it a regulation for my regiment. At the next spring foot parade, which then always took place, the King looked at the regiment with his eagle eye, which took everything in, and said; "At last I see men well set up; I have always been told that the artillery could not pay attention to this, on account of their special work, but I now see that it can very well be done." The march of the men was also freer and unconstrained than it had been before. And with all that the soldiers had been less tormented than in previous years.

This success encouraged me to study yet more closely, so far as my special duty with the artillery permitted, the administration of the detail of training, as it has developed with time among the infantry of the Guard. I found such care for the education, training, instruction, and health of each individual man as could in few families be improved, while it was far greater than any man of the lower classes of the people would ever find in his own family. The maintenance of discipline was brought into careful connection with instruction in drill, and all exercises, including the gymnastics, used to increase both health and discipline, while the natural tendencies of each individual man were most conscientiously taken into account.

In this manner the recruit quickly learns to subordinate his muscles to his will. At the same time he learns also to gradually submit his will to the word of command. In order to secure this it is only necessary to direct that the exercises, even the easiest, shall not be carried out except by the word of command of the instructor. The man being thus accustomed at the word; "arms to the rear!" "arms to the front!" "lift your heels!" "bend your knees!" &c., to make the required movements, the necessary muscles act later on unconsciously

at the word of command, just as the human will compels the members to move, while the man himself does not know that his will first affects the brain, and that from this the order travels by a roundabout way through the nerves to the muscles. The greatest care must be taken that the recruit is not roughly spoken to or frightened. If the instructors (officers or N.C. officers), are gentle, the recruit will soon gain confidence. Together with sufficient and good food, living in barracks of which the sanitation is medically cared for, and in cleanliness such as is quite unusual in most lower class families, the recruit has sufficient exercise of a nature to develop his body, a regular life, and plenty of sleep, in short he enjoys such entire welfare, that he feels how fortunate is his lot, and blindly obeys whatever order his superior may give. Thus is developed the electrifying power of the word of command. That which in former days was begotten of the fear of the stick, is now born of trust, with this difference that its effect is more lasting. Since when in former times the fear of the stick vanished, discipline vanished also. Desertions are more rare in these days.

Especial care is necessary with regard to the connection between the exercises and disciplinary punishment. No recruit, up to the day when he joins the company for duty, that is to say until he is considered to have learnt his elementary drills, should ever be punished for faults at drill. During the 10 or 12 weeks of the recruits' drill no recruit, however awkward he may be, should ever be sent to extra drill or to punishment drill; for the day's work of the recruit is so measured out, that he has no spare time, his hours being divided between drills, exercises, instruction, sleep, eating, &c., as is best for the man's health. More drill would so tire him that his health might suffer in consequence. If there are men (and there always are) who join in such a low condition of mental and bodily development, that they cannot keep up with the others, then the more advanced may be dismissed from their drill earlier than the allotted time. The Captain is generally called upon for an explanation whenever he punishes a recruit during the period of his instruction, whether it be with a minor punishment or with arrest. Such a punishment is not generally given for a failure at drill or for awkwardness, since orders are given that recruits are to be treated with forbearance and patience, even when there is reason to believe that there is some want of will to do right. A recruit is not punished unless there is absolute proof that the fault was intentionally committed, or in the case of such faults as are not allowed by law to go unpunished. The characters of the men vary very much, and there certainly are some who are ill-conditioned, who resist every order and all kinds of obedience, and find pleasure in crime and disorder. These are not however so numerous as is believed. But if it be once taken for granted that want of will exists, when in truth it is only want of intelligence and awkwardness, true ill-will is easily produced. It is thus better to have too much patience rather than too little.

When certain companies have acquired especial skill in the systematic training of their men, and when they have had luck in the recruits posted to them, so that they by chance have not received a single worthless individual, it has happened that they have in this manner created an excellent discipline, and have not found it necessary to give the punishment of arrest during a year or eighteen months. And these companies are moreover the best in drill, discipline, and order.

This systematic training of the infantry soldier, and the care given to each individual man, even in his musketry course and in his work in the open country after he has finished his drill as a recruit, is one of the principal causes of our grand success in the last great war. The soldier endured all hardships, not from fear of punishment, but through confidence in his officers; he looked upon his toil as something unavoidable, as his fate, for he knew that if it had been possible he would have been spared it; he followed his officer in battle out of sheer trust; he was not discouraged even when he found the enemy in superior strength; he never suffered from panic, for he knew the value of mutual support and held to it, not because he was obliged, but from love for his regiment, in which everything had always gone well with him.

At a time when the soldier is supplied with an accurate fire-arm, and when the well-aimed fire of individual men must have more result than ill-aimed volleys; when the soldier, in order to fire well and with good effect, must lie comfortably on the ground instead of standing in a close crowded line; when he is, moreover, no longer a mere portion of a stiff machine, since each man can use his weapon with intelligence; when the infantry have ceased to be only food for powder, and have become a combination of single units working independently, at such a time the careful training of the individual soldier must decide the issue of battle.

But the task which year by year falls to the instructors of recruits is a difficult one. The greater proportion of the recruits come to the regiment raw in every respect, bodily, morally and mentally; no inconsiderable number of them have already been in prison. I have said above that the recruit is as a rule neither good nor bad; the greater part of our nation is, at the age of 20 years, morally and intellectually, at the standard of a child of educated parents at 10 years old. There are even some individuals who are beneath this. I have had recruits who found great difficulty in pronouncing the number 34. I asked one of these to count. His scale of numbers went up to 11; he had heard of 13 and 17, but he did not know what they meant. This was a German; the Slavs of our fatherland are still more difficult to educate, since they do not understand German. They are further accustomed to an almost incredible amount of roughness in their intercourse with their parents and associates. I remember a recruit who could only speak Polish, of whom I as a Lieutenant had to undertake the training, and who did not understand a single word that I said, and stood staring vacantly before him. I told another of the recruits, who could speak German and Polish, to translate what I was saying. This fellow went up to him and gave him at once a tremendous box on the ears. When I reproved him for this, he met me with the startling argument; "Oh, you must let me do it, Lieutenant, he understands much better now." The box on the ear in their society answered the same purpose as "Do you hear?" does in Berlin, or as the touch on the shoulder which many men use to draw attention to their words. What patience is required to make such men understand all that belongs to their duty in the field, to order, and to discipline, without even once knocking them down, he only can know whose forbearance has been thus put to a practical test. If sometimes an excitable and eager N.C. officer or lieutenant loses his patience, and has to answer before an inexorable court-martial for some blow given by him, looking at things from the point of view of human nature one can only pity him. When I therefore read, either in the Press, or in the reports of the

Landtag or Reichstag, similar isolated cases angrily quoted as examples of a universal and overbearing military despotism, I cannot help wishing that each of those who so speak, write or vote, might be compelled by law to serve first for twelve years as an officer or N.C. officer.

From the moral point of view also many recruits are as backward as a child of 10 years old. Among many of them no trace can be found of the feeling of duty, of religious conscience, of patriotism or of honour, while there is a proportionately small percentage of them who have any idea of good or evil. The great mass only know good from evil from the fact that the latter is punished. "I will not do this or that, because if I do I shall be put in prison or in the House of Correction." Many recruits hear first of duty, honour and patriotism from their instructor after they have joined the army. Many of them, even from parts of the country where German is spoken, know nothing of the history of their fatherland. There is a sort of figure of speech which we use when someone has said something which everybody knows; "Yes, old Fritz is dead." By means of this I discovered that many of my men had never heard of Frederic the Great. I asked one of them once and he answered; "Yes, I heard that he had died yesterday."

It is the more difficult to train such men as they are mixed with others educated to a higher moral and mental standard, and these more advanced and cultured persons must be trained in quite another manner. It is only wonderful that the patience of the instructor of recruits does not fail him under this labour of Sisypheus. The brilliant saying of one of our most talented men; "Our victories were won by the German schoolmaster;" is only partially true. They might more justly be said to have been won by our N.C. officers; but they are instructed by their officer, and he by his superiors, while the most advanced among cultured men are trained by professors and by learned soldiers. When on the 29th January, 1871, the forts of Paris were surrendered to us, I happened to be going on duty from Versailles to St. Denis. I followed the Seine from St. Cloud to Argenteuil. On both sides of the road the paths were covered with groups of soldiers drilling singly and being practised in positions, facings, manual exercise, &c. They were men of the reserve battalions, who had been sent to the front scarcely trained; as soon as the infantry found time they set to work to complete their instruction. I and the officer with me could not help laughing, but it was with joy and pride, for only in the Prussian army would such things be possible. Of this we were further convinced by the remarks of the French inhabitants, who had come from both banks of the Seine, from Paris and the villages and were astonished at these doings. They said; "Look at them, they are drilling still after their victory. If our fellows had won, they would have spent the whole day in drinking and amusing themselves. It is clear enough that we have no chance with them."

When I say that the training in detail of each individual man was one of the principal reasons why our infantry was victorious, I do not by any means maintain that even this might not be improved (for what human institution is altogether perfect), nor that this manner of training is carried out as well and wisely in every infantry regiment of the German army as it is in the infantry of the Guard at Berlin. When I received the command of a division of infantry in the provinces I found that the principles which I have stated above were by no means universally applied. The gymnastic exercises were practised more for

themselves, because they were laid down, than as a means of instruction, while the class of recruits were more difficult to manage and the staff of instructors was not so skilled. The big and already well-shaped men who are sent to the Guard are naturally more easily trained than the many rather unshapely recruits who go to the infantry of the line. Men morally perverted, who have already committed crimes for which they are outside the pale of society, are never sent to the Guard, and thus the infantry of the line has to deal with thieves and other criminals. Moreover the N.C. staff of the infantry of the line is not from its social position so well educated as is that of the Guard, since the attraction to the capital of the German Empire is naturally stronger than that to some small garrison, in which there is no opportunity of acquiring a connection which may be of use for later advancement. But how desirable it is that the N.C. officer should be better educated than the recruits will be evident to everyone who realises what patience, as has been shown above, he must exercise towards the private soldier, and how superior he must feel himself to him, not to lose his temper when he comes across great awkwardness, taking care not to mistake the latter for ill-will, until he has made sure that ill-will does truly lie behind it, which is indeed often the case.

It is therefore of the greatest importance that the career of a N.C. officer should be made tempting to the more educated classes. Much has been done in that direction already; their life in the regiment has been made far more pleasant. But the most important point, to my mind, is that the state shall buy up the administration of all lines of railway. When all the railways, as were the post-houses, are administered by the state, no one except soldiers recommended for civil appointments will obtain employment on the railways, posts and telegraphs. Then all those who wish to embrace such a career, and have the necessary education, will be compelled to serve for the requisite time, and the N.C. officers will thus be supplied by a class of men so well educated, that it will be possible to promote them quicker, while perhaps the qualifying time for civil employment might be reduced to 10 years, by which again the supply of well-educated men for N.C. officers will be increased.

I cannot here refrain from mentioning another matter. The practice in instruction which a N.C. officer has as an instructor of recruits is the very best preparation for the calling of civil schoolmaster. But never yet has a N.C. officer been made a schoolmaster; on the contrary the candidates for such appointments have their term of service shortened. If the civil schoolmasters were selected from discharged N.C. officers only, a still larger number of educated men would select that career, while the teachers of youth, and the youth itself, would gain a greater sense of order, right and law.

Do not condemn me, on account of my proposals, as a reactionary, who wishes to enslave the whole country under the military power of the soldiery. Having an army organization, which is rightly called "The People in Arms," we ought during their childhood to train this people who are to bear arms to a sense of order and law, so that they may not some day sword in hand threaten the whole social order with destruction.

After this digression from my narrative, I will add that in the division of which I took over the command there were great difficulties with regard to language, since more than half of the recruits were Poles by

birth, and most of these did not understand German. The sense of right and law was even less developed among them than among the lower classes of Prussia. Cases not seldom occurred, where men before they entered the service had committed serious crimes, such as arson, or where they falsely accused themselves of similar crimes with the sole and only object of being transferred to a punishment company and of being discharged from the army, so that they might not in case of war run the chance of being shot.

For all these reasons the system of individual instruction did not take such root in these regiments as in the infantry of the Guard. I did my best to introduce it gradually; *gradually*, since a matter which called for the zealous help and assistance of each individual could not be arranged all at once by a mere order. Indeed an order stood in the way of any such action, since by regulation the direction of the detail of the training of the men is the especial charge of the officers commanding regiments. In them I found willing assistants; good results soon showed themselves. Love of praise and emulation between the different regiments did the rest. Crime, punishments, want of discipline and desertions visibly diminished, and the men had in a few years a freedom and elegance of step, which compared well with the painfully stiff pace of the former soldiers.

In such a highly educated and willing body as is the Prussian corps of officers it is only necessary to suggest anything and the efforts of all the junior officers will certainly help most willingly to complete it and bring it to perfection. So I found in this case. The infantry of the Guard had already abolished the balance-step, my officers went further, and replaced, as a preparation to marching, the slow march by gymnastic exercises and worked back to the former from the quick march, just as in the case of a remount the short trot and the medium trot are developed from the natural pace. The success was most visible. Up to that time it had been found very difficult to teach the small Silesian men to take such long steps as those required by the regulations, namely 100 to 80 metres. It was now found that the recruits could at the inspections in the barrack-square march 80 metres without difficulty in from 82 to 90 paces; one company had even taught its recruits to step metres. The men, being accustomed to such long paces, had no difficulty at a later date, carrying their packs and moving over uneven ground, in marching with the regulation pace of four-fifths of a metre, and developed a power of marching which often on the occasion of the manœuvres astonished both the superior officers and the spectators. It is moreover natural that the slow march with the balance-step should tend to shorten a man's stride, instead of making the recruit stretch his legs, for when he has to stand for a moment on one foot with the other extended in front of him, he is obliged to throw his weight on the rear foot, and this shortens the pace when the advanced foot comes to the ground. Again the slow march, with the balance-step, is an unnatural movement, which causes pain to the recruit in proportion as his muscles are wanting in pliancy. It must be quite wrong to begin with the most difficult practice; while when a man has once learnt to march in quick time the other paces are of no use. In former days these two kinds of marching were practised for choice by such instructors of recruits as had nothing to think of, who looked stupidly to their front, mechanically and slowly repeating; "21-22." Thus it happened that a tortured, though willing, recruit, driven to despair by the pain in his cramped

muscles, would throw his rifle on the ground or at his instructor's head, and then had to be punished by law for such insubordination.

I am afraid that I have already annoyed you too long with these petty details! and I will not try your patience any longer to-day, since I propose in my next letter to examine in the same manner into some other points connected with instruction, unless indeed you write to tell me that you are weary of it all.

3rd Letter.

CONCERNING VARIOUS OTHER POINTS CONNECTED WITH THE
TRAINING OF THE INDIVIDUAL SOLDIER.

SINCE you encourage me to continue my remarks on the details of instruction, I will run the risk of being wearisome, and pass from the gymnastic exercises to applied gymnastics, *i.e.*, exercises with apparatus and the bayonet exercises. Though in these practices the infantry naturally attach special importance to matters which are useful to them on service, such as climbing, jumping over ditches and the combat with the "arme blanche," yet they do not lose sight of the necessity of a healthy development of all the muscles, and each man derives a lasting benefit from them in the progressive strengthening of his body.

But no instructor of gymnastics escapes from one danger, namely that of preferring to teach very advanced practices to some peculiarly skilful pupils, rather than to endeavour to push on the most awkward and the most clumsy, and to improve them sufficiently that they may come up to every requirement which can be called for in a good infantry soldier. It is true that at inspections the remarkable performances of some individuals attract attention and gain credit for the instructor, while exercises of ordinary mediocrity pass unobserved. It is true that the division into three classes, gymnastics, jumping and bayonet, are intended, inasmuch as men of the same calibre are placed together, to prevent this danger, but the captain also, who instructs the whole, is easily tempted to take the greatest interest in the exercises of the first of these classes, and to take only a step-motherly care of the others. Many captains even take particular pride in showing a very numerous first class, in which case the performances of individuals in this class will be of very various degrees of excellence.

If the lists of the men in hospital be examined, you will find that a company commanded by such a captain has a very large number of men admitted for accidents at gymnastics. For a man who is passed into a higher class, before he has been properly instructed in the lower, will attempt things beyond his power; for instance, he will fail to jump high enough and will strike the jumping horse, or he will come to the ground awkwardly and sprain his ankle, and so on.

On the other hand I have seen some companies, in which even the most awkward and clumsy men did very satisfactory practice, while but few (2 to 6 men) figured in the first class, and these were soldiers who had already been skilled gymnasts when they joined the regiment. I remember one company, of which all the men climbed out of the windows of the barracks, ran a certain distance over all kinds of obstacles, and finally climbed in again at the windows. In this company there had been no single accident at gymnastics during the whole year, and the men looked in good condition, red-cheeked and jolly. It is true that the captain was an intimate friend of, and had served in the same garrison with the originator (Stocken) of our military gymnastics, and

had learnt from him to accustom the muscles first to the easier exercises, and not to go on to the more difficult, until they had gained the necessary suppleness and elasticity. When this is not seen to, it may very well happen that the more difficult practices are clumsily done, while the man hurts himself in doing them. It cannot be too distinctly laid down that each man should be able to do the most elementary and easiest practices with the most absolute excellence and neatness. He who cannot, for example, jump standing with due elasticity, rising off his toes and bringing his body back with his toes and a slight bend of the knees, though he may have enormous strength, so that he can jump across or lengthways over the horse, will nevertheless always run a risk of landing on his heels and of either jarring his spine or spraining his ankle. If gymnastics are taught and carried out in every detail no accident can ever happen. But if they are unintelligently carried on, accidents will happen, while the men will lose their confidence and will become nervous and disinclined for them. But no man ought ever to be brought into this condition. The more timid he is by nature, the longer must he be allowed to gain confidence by doing the easier exercises, and the more gradually must he be passed on to the more difficult. I have only met with one man in the whole of my service who never could get over his natural nervousness. Before he had been drawn as a recruit his father, a Jew tradesman of my native town, whom I had known from childhood, came to me and urgently begged that his son might be exempted from serving, as he had no courage and would only bring disgrace upon the regiment. As the law did not recognize this want as a reason for exemption, I could not listen to his prayer. At the gymnastic inspection the company finished by running a course over the regulation obstacles, of which the final one was a ditch, which formed a branch of the river Neisse. Young Hopeful came at it last. When he got to the take-off he gave a yell of anguish, threw his rifle with its fixed bayonet into the water, jumped on all fours and fell like a frog into the ditch, in which he stood covered with slime up to the hips. Amid a roar of laughter from the whole company he waded to the other side. But such an exhibition as this is very rare. It is safe to say that every man who is sound in wind and limb can practice all that is needed for an infantry soldier.

The superior officer who inspects in gymnastics can do very much by the manner in which he inspects. The time that is at the disposal of the inspectors is, as a rule, very short, since they prefer to judge of the different grades of instruction of various bodies of troops on nearly consecutive days, in order that they may have a correct standard of comparison; besides their journeys from one garrison to another take up some little time. A detailed inspection of the drill and musketry generally occupy the morning, and after as hasty a meal as possible the tired mind in the tired body turns its attention to the gymnastics. Can we wonder if the inspector then prefers to see the remarkable and more entertaining exercises of the first gymnastic and fencing classes rather than weary himself with the elementary work of the lower classes. But by this the inspector does harm. That which is inspected will be practised, and this is the more true as the period of peace grows longer; this is the natural consequence in the army of military obedience, and if the superior officer inspects only the first gymnastic classes, the regiment will neglect the instruction of the others. But the training of the latter is the most important, since it is most necessary to teach everyone all

NOTES:

BY VARIOUS HANDS.

MR. EDISON'S LATEST INVENTION.

MR. EDISON (says a correspondent of the *Times*) has just crowned his remarkable series of inventions by another which promises to work a revolution in our present methods of dynamo construction. He has, in fact, solved a problem which has occupied the attention of electricians for some time past—the problem, namely, of directly transforming heat into electricity—of doing away, in short, with the existing clumsy method of first transforming heat into motive power by a steam-engine and using that motive power to drive a dynamo. Mr. Edison uses the heat at first hand. It is the heat itself which drives the dynamo and generates the current in it. Hence the name “pyro-magnetic” which he has given to the new dynamo and motor which he brought to the notice of the scientific world at the recent meeting of the American Association for the Advancement of Science. As the invention is still being perfected, we need do little more now than explain the principle upon which it is based. It has long been known that heat affects the magnetic properties of certain metals to a considerable degree, notably of iron, cobalt, and nickel. A piece of iron, in fact, as has been shown by Professor Hughes, loses its magnetic property when heated to a cherry-red, but regains it on cooling again. It is also known that any variation of the intensity of a magnetic field produces an electric current in a conductor situated in the field. By ingeniously combining these two facts, Mr. Edison has produced an electric motor and a dynamo, in both of which heat is directly applied to vary the intensity of a magnetic field, and thus to produce an electric current in the one case, and the motive power in the other. The motor is the simpler machine of the two, and consists essentially of a permanent magnet, having a bundle of small iron tubes placed between its poles, and free to rotate on an axle at right angles to the plane of the magnet, like the armature of an ordinary dynamo. The walls of these iron tubes are very thin, and hot air is sucked through them to heat them up. The arrangement is such that when all the tubes are heated in this way there is no motion of the bundle—or, as we may term it, drum—upon its axle. But by means of a screen cutting off the heat from a part of the bundle of tubes, and revolving round an axle, the symmetry of the arrangement is destroyed, and the bundle or drum being part cold and part hot—that is to say, part magnetic and part non-magnetic, falls under the unequal influence of the two poles of the permanent magnet and begins to rotate on its axis. It becomes, in fact, a magnetic, or rather a pyro-magnetic, motor. In the generator, which is based on the same principle, there are eight electro-magnets arranged radially, and having in front of their poles two disks of soft iron wound with eight rolls of fine wire. When the electro-magnets are excited these disks become magnetic by induction and a current is generated in the wires. The whole is exposed to the heat of a furnace, and the hot air traversing the disks and rolls demagnetizes the disks. By the use of screens, however, part of the heat is cut off intermittently, and thus, by restoring and taking away the magnetic property of the disks, by cutting off and letting on the heat, an electric current is maintained in the

rolls of wire and collected by means of a commutator, as in ordinary dynamos. The first motor constructed on this new principle was heated by two Bunsen burners, and developed a power of 95 kilogrammetres a minute. A larger one weighing about 750 kilogrammes, and giving about three-horse power, is nearly finished. The results hitherto obtained show that the expense of fuel for the same electric energy with the pyro-magnetic dynamo will be equal to or less than with the ordinary dynamo and engine. Moreover, the power of the new dynamo will be less, weight for weight, than that of the ordinary dynamo; but, on the other hand, the pyro-magnetic dynamo will allow of the waste heat being utilized for other purposes, such as heating the building, and so on.

"THE RECORDS OF THE WOOLWICH DISTRICT."

MESSRS VIRTUE & Co. are now bringing out in 20 parts "The Records of the Woolwich District." The author, Mr W. T. Vincent, has evidently shown great care in compiling this work, and we feel sure it will be read with great interest by officers of the Royal Artillery.

THE NEW RIFLE.

ARTICLES on the New Rifle for the Army appeared in the *Times* of 4th and 5th September and in the *Morning Post* of 26th September, 1888.

A TOUR IN BULGARIA.

BY

LIEUT.-COLONEL G. T. CARRE, R.A.

IN August, 1887, I left India on three months' leave for the purpose of travelling through as much of Bulgaria as the length of time would permit; my object was to see the country and people, visit the principal battle-fields, and to enquire into the military organisation and resources of this new nation.

The political crisis at Sophia, and the acceptance of the vacant throne by Prince Ferdinand of Coburg had, at the time of my visit, excited in Europe more than ordinary interest in Bulgarian affairs, and was an additional inducement to visit his capital.

The route I selected was from Constantinople to Philippopolis, thence I made a tour to the Schipka Pass, and the battle-fields of Kesanlik, Duranlik, Eski-Zara, Yeni-Zara, returning by rail to Philippopolis. I then continued my journey to Sophia, and across the Balkans to Lofschia, Plevna, and Nicopolis; from thence I took steamer to Rustchuk, completing my tour by the valley of the Lom to Rasgrad, Yeni-Yuman, Shumla and Varna.

The greater part of the journey was made by road, stopping for the night at roadway inns or *khans*; thus I made a real exploration of a considerable extent of country, and had good opportunity of studying the manners and customs of the people in the several districts through which I passed. On the battle-fields I obtained the services of guides from the neighbouring villages, and assisted by old soldiers, who had themselves taken part in the engagement, made myself acquainted with the details of the fighting, and often heard interesting facts, connected with what had taken place, that are not generally known in the history of the Russo-Turkish war.

With the permission of the Minister of War and through the kindness of the Commanding Officers, I was granted free access to the barracks; I saw the troops in camp, and at their manoeuvres; every facility being provided me in obtaining the information I required regarding the equipment and organization of the Bulgarian Army.

Under these advantageous circumstances I trust to be able, in recording the journal of my travels, to write a real and true account of Bulgaria as it now is, and of the feelings of the people regarding the present state of the country's political horizon.

It was my impression that I should find a wild and disturbed country, that travelling might be dangerous, and that, at any rate, I should meet with endless difficulties and interruptions. How different

the reality ! I find a prosperous agricultural people, a country smiling in corn-fields and vineyards. The corn has been cut and gathered, but clusters of white and purple grapes hang from the vines that cover the slopes both north and south of the Balkans ; flocks of sheep browse on the downs, whilst herds of oxen, buffalo and horses graze peacefully in the valleys, or range over the undulating hills of stubble. I find the people industrious, quiet, frugal, and free from most of the vices of their more educated neighbours. On Sundays they shut their shops, stop cultivation, attend church, and are then and always simply good. Instead of encountering brigands on the road, I was able to travel fearlessly and unarmed through mountainous passes and over miles of rough broken ground. I had no need to lock my doors either by day or night. I was never robbed, and seldom cheated, but travelled in perfect security, meeting with civility on all occasions.

The satisfactory state of the country is doubtless due to the wise and just rule of the late Prince Alexander of Battenburg, who did much for the practical improvement of the condition of his people.

The erection of schools, the improvement of roads, the opening of fresh districts by better means of communication, the building of the International Museum, the Library, the Sophia University, the roomy barracks in all the principal towns, are monuments of his administrative skill and wise philanthropy.

Morning and evening the soldiers may be seen undergoing vigorous drill and practising manœuvres. The young army, that fought so well at Slevnitza, full of dash and enthusiasm, are being taught to combine steadiness with discipline. In short, Alexander's brief rule of eight years was characterised by a ceaseless activity towards progression, both as regards the civil and military improvement of the country.

His vigour, on assuming the government of United Bulgaria, the manner in which he stifled the hatred that existed between Christians and Mahomedans, and reconciled the Sultan to the change, proved that he was a statesman of power and quick decision ; the promptitude with which his army was mobilised, changing front, and repulsing the sudden and unexpected invasion of the Servians, from the very door of his capital, all went to show that he was also a military commander of high merit.

It is difficult to understand how a Prince, who had done such great things, and had identified himself so much with Bulgaria, could possibly have been kidnapped in his own palace, but it must be remembered that, at the time, there was still a strong Russian party at Sophia, and that the purely Russian administration organised by Prince Doudakoff Korsakoff, the first appointed Governor-General, still retained considerable influence over the young Bulgarian representatives at Sophia, and that the people had, up to then, been accustomed to see not only their officers, but even their own Prince, treated with haughty disdain by Russian officials. Yet it is sad to remember that there were actually officers of the army, and members in the council who, bribed by Russian gold, and promises, were not above sacrificing their own, and their country's honour, by abetting,

if not actually aiding, Prince Alexander's abduction. They have reaped their reward and are now exiles from their country without a hope of return.

To account for the reason of Russia's interference and evident antipathy to the Prince whom she had herself seated on the throne, requires us to glance back and examine her position in Europe since the "Berlin Treaty."

Russia, no doubt, was far from being pleased with the results of the war. The Turks had offered a much stronger resistance than General Ignatieff, her representative at the Congress, had led her to expect, and though, at the time of the conference, her victorious army lay encamped round the Ottoman capital, the cost in treasure and material had been enormous. She knew that England would go to war rather than allow the Muscovite flag to wave over the Bosphorus or Dardanelles. Austria was also considerably agitated by her designs, so she certainly was in no position to dictate terms to Europe; on the contrary, she had to submit to European decision in the very withdrawal of her army from the new Turkish frontier, and to consent to the evacuation of all the territory for which she had shed so much blood, within one year of the signature of the Berlin Treaty.

The principal result of the Treaty, as regarded Europe, had been the creation of the two states Bulgaria and Eastern Roumelia. The former, although under Turkish suzerainty became, in reality, an independent state; the latter retained a closer connection with Turkey, under an Ottoman Governor-Resident at Philippopolis. Russia agreed to this arrangement, but there is no doubt she entertained the hope that the two would eventually form one province under her own rule.

From the commencement, the vigour of her diplomacy was made to bear on the attainment of this object, she did her best to defeat the arrangements which had been sanctioned at Berlin, encouraging, through her officials, every kind of agitation on the part of the populace. She posed as the liberator of both provinces, and as the champion of Christianity against Mussulman superstition, and as such, appealed to the inhabitants for implicit obedience to her wishes. At first, everything went as Russia desired, but after a time, the corruption of the officials, and the insolence of their demeanour rendered them extremely unpopular, and the disappointed Bulgarians looked to their Prince to save them from despotism.

By Article VII. of the Treaty of Stephano, afterwards ratified at Berlin, it had been clearly settled that the ruler of Bulgaria should be a Prince, elected by the people, confirmed by the Sublime Porte, and subject to the approval of the Great Powers (no members of whose reigning dynasties were eligible), and the same course was to be adopted whenever the dignity became vacant.

The legislative authority of Bulgaria is vested in a single chamber; the National Assembly or Sobranje, the members being in the proportion of 1 to 10,000 of the inhabitants, and the duration of the term of office is four years.

For the purpose of electing a Prince, a Special or Grand Sobranje

has to be convoked consisting of twice the number of representatives.

On the 29th of April, 1879, in accordance with the abovementioned article of the Treaty, the first Grand Sobranje met at Tirnova for the purpose of choosing a monarch. There were three candidates for the sovereignty, namely, Prince Waldemar of Denmark, recommended by the English, Prince Alexander of Battenburg, by Russia, and Prince Reuss, who retired early from the conflict. The verdict was pronounced in favour of the Czar's representative, and the Prince of Battenburg, son of Prince Alexander of Hesse, ascended the throne as the first elected ruler of Bulgaria. At the time he was about 22 years of age. His portraits represent him a tall, soldierlike, handsome man.

The Deputies forming the first Bulgarian Parliament assembled in February, 1879, at Tirnova, a town which, since the Russian occupation had been the head-quarters from which mandates had been issued for the government of the conquered provinces. The Chamber consisted of 222 members, of whom 108 were ex-officio, 92 were elected by popular vote, and 22 were nominees of the Russian Governor-General, Prince Doudakoff. The Parliament sat until the 28th April, discussing the scheme for the future Bulgarian Government. Amongst other laws it was decided that the legislature should consist of elected members only. This was carried to the great annoyance and astonishment of the Russian members, who hoped that the assembly would become a passive tool in their hands for the furtherance of their own ulterior projects, and were quite unprepared for the independence which those representing the country had exhibited at their first sitting.

It may be noticed from the very first, the Bulgarian Parliament opposed Russian interference, and the Prince, becoming year by year more and more one of the people, stood out as the champion, leading them to become an independent and self-supporting nation.

The manner in which the population hurried to their colours at the time of the mobilization of the army on the Turkish frontier at the Union, the willingness with which the country bore the requisitions of war, and the gallantry displayed by the army in the expulsion of the Servian invader, together with the generally improved condition of the country and people, were proofs that the Bulgaria of 1885 had become a nation fitted to be enrolled among the powers of Europe. The time had come when Bulgaria could say to Russia :—"We appreciate all you have done for us, you have liberated us from the Turks, you have taught us to govern, and our army to fight, and we now wish to be left to ourselves." But it was not the aggrandisement of Bulgaria that had induced Russia to enter into contest with Turkey. She had made much of the Pan-Slavic idea, and her priests had even preached a crusade in aid of their fellow Christians; but the real object of her aggression in 1877 was the same as it always had been and now is, namely, to plant the Russian standard in Constantinople, and, in possession of the Bosphorus and Dardanelles, to stand forth no longer as an Asiatic power but as the great ruler of the future destinies of Europe. That a new nation should rise to block the road to the

attainment of her wishes was the last thing Russian policy could permit. Bulgarian progress had to be arrested at any risk, hence the crisis at Sophia and the abduction of Alexander in July last. Had the National Assembly at Tirnova in April, 1879, elected a Russian to sit on the Bulgarian throne, the St. Petersburg Cabinet would have had only to issue orders to attain implicit obedience, but the Emperor Alexander's own dictates forbade such an election. Her present determination seems to point to a change in her policy, and she will only consent to her own nominees. She objects to Prince Ferdinand of Coburg, who now sits on the throne, and his position has, in consequence, neither been recognized by Turkey, to whom he owes suzerainty, nor by any of the other great Powers of Europe.

The Eastern Roumelia Bulgarians had always been dissatisfied with the upsetting of the San Stephano Treaty; they much preferred being under one command; so, on the 18th of September 1885, the revolutionary committee at Philippopolis rose against the Sultan's rule. The insurrection was bloodless, and was carried out secretly and well. The leading members of the party walked quietly into the quarters of the Turkish Governor-General, Gavrid Pasha, informing him that his rule over Eastern Roumelia had terminated and politely requesting him to make his own arrangements for immediate departure. The Commander-in-Chief was placed in arrest, and, with his army, ordered to leave, and a telegram was despatched to Prince Alexander offering him the throne. In one day the whole affair was settled. The Prince, though doubtless aware of the existing state of affairs, can hardly have been informed of what was about to happen in Roumelia; for at the time of the rise he was at Varna, and it was there that he received the offer of the crown.

It was an important era in his career, and his actions, as described to me by an officer of his personal staff, were as follows:—"The message came to him direct—no one knew of its purport. He took two hours to consider the situation, and decided to accept the Government. Sending for the few ministers he had with him on tour, he explained the reasons for his acceptance, saying: 'I shall probably lose my crown, but I am the only man in Europe who can prevent a recurrence of the fearful massacres that took place during the late war; it is my duty to God, and I accept.'" Instructions to mobilize the army were telegraphed to the military centres at Sophia and Shumla, and, with one regiment, he made a forced march over the Schipka, arriving at Philippopolis in an incredible short space of time. The army was at once put in motion, and before the Turks had time to think what their own movements would be, the Bulgarians had massed on their frontier. The main body was posted between Tirnova, Simenli, and Yamboli. 4,000 men were at Philippopolis, with a brigade near Kustendil, though stringent orders were issued to commanders neither to cross the frontier, nor to provoke hostilities in any way. From Philippopolis he issued orders for the government of the annexed country; he reconciled the Mussulman population to the change, allowing them to retain their arms, and thereby trusting to their honour for good behaviour. He acknowledged his suzerainty to the Sultan, thus propitiating him to the change of circumstances.

The Turks allowed events to take their course. The Sultan, all for peace at any price, thought Russia had something to do in the movement. The army was unpaid, and refused to move until they had secured the arrears due to them. Nothing could be done. Thus without bloodshed, Eastern Roumelia and Bulgaria became one, under the title of United Bulgaria, and retain the same boundary lines up to the present day.

Nature has been especially favourable to Bulgaria in the demarcation of her boundaries; the geographical formations of the interior adding considerably to the strength of her defence; this is particularly noticeable on the north where the Danube forms the first obstacle to invasions, and where, within eighty miles inland, rise the mighty Balkans to arrest an aggressive army marching southwards on the Capital.

The country thus enclosed is also provided with natural flank defence. On the west, the road from Sophia leads to the old Plevna-Nicapolis lines, whilst the river Lom on the east, taking its rise in the mountains, flows through a series of strong positions, to join the Danube, near to the town of Rustchuk.

It would seem that, at one time, in some geologic epoch, the Balkan range must have extended due east and west from the Black Sea to the shores of the Adriatic Gulf, and that a secondary upheaval coming from the direction of the Alps, had altered the original position of the range, throwing it back to form the mountains that now lie in a confused mass on Bulgaria's western boundary, separating her from Servia, Macedonia, Roumelia, and commonly known as the Rhodope branch of the Balkans. These precipitous forest-clad sides debar invasion from that quarter except from Servia, where the Belgrade-Sophia road, leading through the Dragoman Pass, enters Bulgaria by the Slevnitza battlefield, where the earthworks still remain as a warning to Servia; and a second line further protects the capital from future attack. On the east a line from Silistria on the Danube, to a point on the coast of the Black Sea demarcates the boundary of Roumania's trans-Danubian province of the Dobrudscha. The country on this side is flat, and is the weakest point on Bulgaria's armour of defence; should attack come on that side, the Bulgarian defence would be forced back to rely on the Rustchuk-Varna line, which is a natural position of great strength, and is supported by the garrison towns of Rasgrad and Shumla.

In the delimitation of the new boundary lines between Eastern Roumelia, the members of the Berlin Treaty were certainly over generous to Turkish interests; the Ottomans now retain by far the largest proportion of advantageous positions along the frontier. But Bulgaria need have no apprehension of invasion from Constantinople; it is more probable that she herself, may, some day, become the aggressor, and extend her frontier to the Maritza and Mediterranean shore.

Owing to its breadth, the rapidity of its current, and the natural formation of its banks, the Danube is a difficult river to cross from the northern side. The right bank commands than of Roumania which is

generally low and swampy. The breadth varies from 600 to 1,200 yards, in a few places it is even broader, while numerous small islands change the main channel, diverting its course from bank to bank. The seasons of the year have considerable influence on the state of the river; in September the shallows are with difficulty crossed by the Austrian Flotilla Company's steamers, drawing about five feet of water, and from Christmas time to March the river is frozen or rendered unnavigable by floating ice.

Though Widdin, Rustchuk and Silistria, are garrison towns situated on the banks of the Danube, they can hardly be considered as influencing its defence, or protecting its crossings, for by a clause in the Berlin Treaty, the Bulgarians are not permitted to hold fortresses, or have guns in position.

The want of lateral communication and the difficulty of massing and concentrating an army on the banks of the river were plainly demonstrated in the poor defence made by the Turks under Abdul Kirim Pasha against the Russian crossing of 1877; but at the same time, the number of main roads into the interior are restricted to those leading principally from Rustchuk, Sistova, Nicopolis and Widdin, and it stands to reason that it would be an utter waste of strength to attempt the passage at any other point than where roads exist. The Danube is crossed by no permanent bridge below Buda-Pesth. Numerous small rivers take their rise in the Balkans, and in other minor water-sheds, and wend their way to the sea, or increase the waters of the Danube, acting as fertilisers to the agricultural districts through which they flow. With the exception of the Maritza and Tundja streams, they are insignificant in size and of small strategical importance; these two, on the contrary, are partially navigable and influence geographically the relationship between Bulgaria and Turkey.

The town of Adrianople may be considered as Turkey's northern gate to her capital; an army marching from Sophia on to Constantinople would necessarily have to pass through that doorway. There are two routes by which the approach could be effected, one the main valley of the Maritza leading through Philippopolis, and the other that of the Tundja river. This second valley corresponds to the district known in India as the Doon between the Himalayan range and the lower Sewalic hills. Similarly, in Bulgaria, a ridge of low hills run parallel to the Balkans, forming the valley of the Tundja, which from Yamboli bends southwards to join the Maritza close to Adrianople. Both valleys are highly cultivated and contain some of the principal villages of Bulgaria; a glance at the map will show the strategical value of these routes, either of which may hereafter exercise important results on Bulgaria's future.

There are six routes given as parts of the Balkans which are passable for an army, and there are many others which could, without much difficulty, be made so, but out of these there are only three which are ever likely to effect the movement of troops:—

- (i) The road from Sophia by Orkhanie to Plevna and Sistova.
- (ii) The Schipka Pass which connects the centre of north and

south Bulgaria, and is the main route from Sistova and Rustchuk to Adrianople.

- (iii) The Slevnia route from Shumla to Adrianople, *viâ* Yamboli; considerable sums of money have been spent on the improvements of the zig-zags and gradients over the summit of this pass, which is now quite practicable for the passage of wheeled transport.

These passes, though constituting the main channels of traffic, are nevertheless difficult and contain numerous positions of defence; they, perhaps, might be turned, but it is doubtful whether such hazardous tactics as General Gourko's could be attempted against a force commanded by any other General than a Turkish Pasha.

The general character of the country on the heights is open pasturage, interspersed with patches of dwarf oak scrub, and intermixed with deep tree-clad ravines. In some parts the ground is rocky and precipitous, especially opposite to Kesanlik, where the range is at its highest, some of the peaks attaining nearly 5,000 feet above the sea level. The southern side of the Balkans is the most precipitous, and descends steep into the valley of the Tundja, while on the north, the fall is more gradual, and becomes blended with the rolling plains on the Danube, the wavy hills diminishing in size as they approach the river bank. About Shumla the regular formation of the chain becomes broken into rough and isolated mountains.

The railway from Rustchuk to Varna runs as far as the Shumla road station along a very marked watershed which divides the valley of the Lom from the streams that run eastward towards the Dobrudscha plains. Continuing southwards the line enters a valley resembling the huge bed of a river which leads to the head of the Lake Devna, at the far end of which is situated the port of Varna. This position, 120 miles in length, ranks next in importance to the Balkans as a geographical formation of the country affecting the defence of Bulgaria's northern and eastern frontiers.

Snow falls in the Balkans in October, and remains in the deep winding chasms far into the summer months; during the winter, the main routes are the only cross roads open to traffic, though the shepherd tribes, who inhabit those parts, are accustomed to cross from one side to the other at all seasons of the year. Lately much has been done for the improvement of the roads and principal lines of communication, they are metalled and kept in repair by the Government. Telegraph wires run by the road sides connecting the principal villages and towns *en route*.

Bulgaria is completely an agricultural country. The soil is alluvial, and bears heavy crops of all kinds of cereals, whilst vines are becoming extensively cultivated on the steeper slopes. A few years past vines were sparsely cultivated, and the manufacture of wine was quite insufficient for the consumption.

The valley of the Tundja about Kesanlik is the centre of the attar of rose trade; acres of rose plants are there under cultivation, filling in spring the surrounding country with their odour. Tobacco is also grown.

The general configuration of the country is wavy, looking like a series of huge Atlantic rollers suddenly arrested in their progress, and solidified into black loamy earth.

There are also plains in parts of considerable extent, and in places hilly, rough ground mostly covered with dwarf oak scrub. Southern Bulgaria is singularly devoid of forest trees, but the northern slopes of the Balkans are more thickly wooded, presenting a singular appearance, most of the trees being pollarded, with the branches stacked into the forks of the trunks as fodder for the cattle and sheep during the winter months of snow.

Besides the Varna-Rustchuk line of railway, a main line is open from Constantinople to Tartar-Basarlik between Philippopolis and Sophia; the extension is being pushed on as quickly as the present finances of the country will permit, so as to complete the junction between the Ottoman Capital and Belgrade *vid* Nish. From the station Tirnova-Shemli a branch line runs to Yamboli, and it is the intention of the government to carry it on to Shumla. A line is also proposed from Rustchuk to Sophia which will completely open the countries both north and south of the Balkans.

Although there are no real fortresses in Bulgaria there are many places of strategical importance which in a few hours could be converted into fortified camps. For the defence of the Danube there are Widdin, Rahova, Nicopolis, Sistova, Rustchuk, and Silistria; of these, Rustchuk is of far the greatest importance. It guards the passage of the river at the railway ferry; it is the arsenal, and centre of considerable trade; the town is increasing rapidly in size and importance. It is a position that ought to be strongly fortified, and defended against sudden capture from the north.

In olden days Silistria was a fortress of note, and used to play an important part in the defence of Turkey, but now the works are in a state of decay, and could scarcely be expected to withstand a siege against the artillery of the present day. It is garrisoned by one battalion and forms an outpost in defence of the eastern frontier, but in case of war with Russia, it would have to be abandoned.

Sophia, the capital, is defended by a line of earthworks on the old Slevnitza battle-field, with a second line in support, in a position nearer to the town. The newly built quarter of Sophia contains the palace, a fine square of houses and shops, together with the principal public buildings which have lately been erected under Prince Alexander's supervision. The opening of the railway will add greatly to the importance of Sophia, and will give a great impetus to the agricultural trade of Southern Bulgaria, which is, at present, handicapped by the prohibitory import duties the Turks impose on their produce, and which almost debars Constantinople as a port for Bulgarian exports.

There are no defences at Philippopolis, but the town is built on two solitary hills on the banks of the Maritza, and would be difficult to take by assault. The town is increasing in size, and a fine line of new houses has been built along the road from the railway station. One of the hills bears a Russian monument, marking the spot where

General Gourko stood, when issuing his orders to his victorious army at the battle which was so decisive in its results, that it terminated the Russo-Turkish war.

Outside the town of Rasgrad, an army of 60,000 Turkish and Egyptian troops were encamped in 1877. The position is one of considerable strength, and supports the defence of the Rustchuk-Varna railway.

Shumla was a favourite fortress under the Turkish rule, and stood them in good stead in former times in their fights against the Russians. The town occupies a deep mountain basin against a hill which stands out in the plain as an outpost from the Balkan range, like a great ship at sea. The town is protected by a kind of horse-shoe, whilst the open undulating ground in front forms an excellent position for a covering army. Shumla should be made the arsenal of Bulgaria, and when connected by rail with Yamboli, will become the most important military station in the country. It forms now one of the three depôts of the army.

The total area of Bulgaria is 38,534 square miles, bearing a population of 2,980,000, of whom 67 per cent. are Bulgarians, 23 per cent. Turks; 5 per cent. Greeks; and 5 per cent. Jews or other foreigners. The revenue is £2,016,758. There is no national debt, but Bulgaria has taken over £8,000,000 of Ottoman debt, and is supposed to pay a tribute to Turkey of £423,200. She pays Russia £40,000 every six months, and has to continue doing so until £1,000,000 is paid off towards the expenses of the war of 1877.

Bulgaria possesses two ports in the Black Sea—Varna and Burgas. The former is situated on the Lake Devna, where, for some miles inland, runs a grassy plain parallel to the lake, affording an excellent camping ground for a large army. The railway terminus is on the shores of the lake, but the rails are laid down to the shipping wharves in the town, about a mile distant. To the south-west, the nearest heights are about 3,000 yards to the north-east and could be made into a strong position against attack from inland. The harbour is exposed to the south-east, but the anchorage is good, the bay affords a certain amount of protection to the shipping, and the beach is sandy. The town is well supplied with water, and contains about 6,000 houses. The bay of Burgas offers the only good harbour of refuge between the Bosphorus and the Danube; and affords excellent shelter for a fleet of any size, in all weathers. In the neighbourhood are several sites for an entrenched camp. It is about six hours' steam south of Varna, and would act as a support to ships there.

History says that the original Bulgarian was a Finn. For some unknown cause, a tribe left its northern home and travelling south-east settled for some centuries on the banks of the Volga, about the town of Bolgaris, whence they take their name. After long sojourn in those parts, they followed the tide of emigration, flowing westward, packed up bag and baggage, and, crossing the Danube, found themselves in ancient Thrace. The Thracians were not of Slavonic origin, and they, too, having moved not long before to the same place for fresh pasturage, mixed with their new Bulgarian friends. This inter-

course, combined with their long residence on the Volga, accounts for their Russian-like Slavonic customs and language.

During the 6th century the Bulgarians increased both in power and numbers, overrunning the country both north and south of the Balkan range. After much fighting, the Byzantine Empire forced them from the lower plains to the hills north of the range. There they made Tirnova their seat of Government, shortly afterwards embracing the Greek form of Christian worship. Bulgaria remained independent till 1396, when she came under Turkish rule, remaining so till emancipated by the Russians in the war of 1877. During all this period their national feeling never lessened, and remains as strong as in their former existence.

The Bulgarian peasant is by no means an idle man ; he rises before day-light to feed his working cattle, and is on his bit of ground, possibly two or three miles distance, by the first streak of day ; there he works till dark, preparing the land, gathering in his crops for the winter store, or he may be away with his cart and bullocks conveying his grain to the nearest market many miles away. The women are equally industrious, baking their own bread, spinning wool and cotton, and weaving all the cloths of woollen stuffs for the use of the family ; thus, in their household duties, they are seldom idle during any portion of the day. The peasant's houses are, as a rule, clean and orderly ; a clay floor, with plastered walls, forming two simple rooms and a verandah. The furniture is scanty : a few stools, a table, pots and pans for cooking purposes, and a bed of rugs constituting the household goods ; one or two gaudy boxes, containing the family clothes and treasures, occupy the inner room ; the other, with its open fireplace and chimney, forms the day room. There the family congregate, and it is the sleeping apartment of all except the *père et mère de famille*. The outside yard, in which the stable and outhouses are situated, is always in a state of filthy abomination. Curiously, there are no gardens attached ; the vegetables being brought in from the open fields.

The peasant's food consists of wheaten bread, sheep's milk, cheese, and soup and meat when they can get it. So many of their young men having served in the army, and thus accustoming themselves to meat meals, this luxury has become almost a necessity on their return from work. Their favourite vegetable is chili pepper, grown to a large size and boiled ; they seem to relish hot dishes, using pepper and chili's largely. On occasions when they entertain their friends at dinner, the principal dish consists of a kid or lamb boiled whole. Water is their only beverage at meals, but the men resort, on occasions, to the wine shops, there they gossip and drink, being fond of a nip of raw spirits. They smoke cigarettes nearly all day. There is a great similarity about the dress of the men ; they seem to have no change for either Sundays or holidays ; it consists of a brown suit of home-spun woollen cloth, a coloured cloth wound many times round the waist, a sheep-skin cap either black or brown in colour, and on the feet sandals of sheep-skin with the wool on, which reach up the leg above the ankle ; they resemble the "pabboos" worn by the Tartars of Thibet. The feet are wrapped in bandages ; socks are never seen.

The shirt is of coarse material, worn open at the chest, and the jacket is often thrown carelessly over the shoulder, with the arms hanging loose. During the snows in winter, the men dress in sheep-skins with the woolly side next the body. The women's dresses are much more picturesque, their bright coloured skirts and short petticoats, with the laced bodice and chemisette, set off their robust and well made figures; they generally wear a gaudy handkerchief over the throat and bosom, and another tied round the head; they go barefooted, but on occasions wear shoes or sandals made like the men's. On holidays they appear decked out in all the grandeur of the family heirlooms of belts, bracelets, and hair ornaments of alloyed silver; some are elaborate, and are much prized by the family.

They marry young, are very domestic, and show much family affection, the young man is often engaged before he goes, at 20 years of age, to take his tour of service with the colours; and soon after his return home, two years afterwards, the marriage takes place. The fact of being rejected by the medical inspection for recruits is looked upon by the candidate with absolute horror. He is laughed at by the girls, who, themselves, fine, strapping young wenches, prefer big husbands, and refuse to marry the cast ones. Ceremony is conspicuous amongst the Bulgarians; they, no doubt, have learnt to become ceremonious in their long intercourse with the Turks; this is particularly noticeable in their weddings and funerals—the former is an occasion for a general feast, given by the bridegroom or his people, who often spend large sums in sheep and wine at the carousal. The happy man, with his friends, dance their way through the street to the residence of the fair one, from whence she is conducted to the church to undergo the grand ceremony of crowning by the priest. After a great deal of general embracing, the married couple return to the house where the bridal presents are exhibited; and soon the feast begins, which, with dancing, is kept up to a late hour.

The Bulgarian dance is very curious; the men and women join hands until they form a long line, which then serpentine about to the music of a clarionet and bag-pipe, the step is one short one to the front, one to the rear, with a side glide to the right, the body swaying gracefully to the step and music. The marriage I attended, came serpentine out of one entrance of the courtyard of the house, partially down the street, to enter again by a second doorway; the bride and bridegroom were in the centre of the line, with their friends to the right and left. The dance seems to excite a sort of fascination on the performers, who keep it up, with intervals for rest, for hours, without either variation in time or step to the music.

The burial service is performed by the priest, whilst the friends and relations chant funeral hymns as the body is being committed to the grave; before the coffin is closed they walk past in procession, implanting a farewell kiss on the cold lips of the departed: their grief quiet and undemonstrative.

The peasantry do not relish a lonely life; they congregate together, forming agricultural villages, consisting of a collection of small farms, each house having its own stackyard and outhouses. Generally, the

only buildings of any pretensions, are the Church and Parish school-house, but on the main roads these villages are approaching the form of small towns, and boast of a main street containing various shops, one or more inns, and a Government Telegraph and Post Office. Throughout those districts that suffered so terribly during the Russo-Turkish war, the villages have been rebuilt in a more solid and improved manner than that adopted in their original style of house; many are two storied, with stone foundations, and planked floorings.

Every family possesses, at least, two pair of working bullocks or buffalo, which are used on the farm in ploughing or dragging loads. The ploughs are home-made of wood, with an iron-tipped share, they are rough in construction, but seem good enough to turn over the light loose soil which is without any stone or solid substance. The carts are four-wheeled, heavy conveyances, mostly made of oak, and are very strong; they carry heavy loads over rough ground; during the snows, the wheels are taken off, and the bodies, placed on runners, act as sleighs.

The army is recruited on the principle of universal compulsory service, exception being allowed only in the case of priests, the only sons of widows, and Mahomedans, who pay £20 exemption. Every young man throughout Bulgaria is obliged, at the age of 20 to send in his name and residence to the recruiting officer of the nearest dépôt and, after medical examination, passes into the service for two or three years, the length of service with the colours for the infantry being two, and for the cavalry and artillery three years.

Should any village produce more than the number of recruits required for the year, the candidates are drawn by lot. Volunteering for cavalry and artillery is permitted, otherwise the recruit is posted to that branch which the recruiting officer considers him best suited for. The strongest men go to the artillery.

On the completion of a soldier's service with the colours, he passes into the first reserve for eight years, during which time he may, at any moment, be ordered by the recruiting officer to rejoin his regiment. The Minister of War issues yearly orders as to the time and duration of the drill of the reserves. Certain districts are sometimes exempted altogether for reasons arising from the state of the crops, sickness, or other local causes.

Military service commences at 20, and ends at 40 years, during which time all, who are not at their drill, either with the colours or first reserve, belong to a National Guard, forming an armed peasantry. They have no uniform, but keep up a certain number of rifles; they are drilled once a week, generally on Sunday afternoons, by drill serjeants, stationed in the principal villages; they are often called out to assist the police, or act as guardians to the roads. In addition to the above, there is a corps of Gendarmie consisting of 2,000 horse and 4,000 foot; the former being mounted on small country-bred horses, patrol the roads, travelling all over the country. In time of war they form a cavalry reserve, and, on the army being mobilised, carry the necessary orders to the mayors of the towns, and headmen of villages. The dismounted portion act as police, in which capacity they may be constantly noticed at police stations.

The total standing army in time of peace is 546 officers, 25,580 non-commissioned officers and men; on war footing, the infantry are trebled, and the artillery doubled, whilst the cavalry are always kept up to their full strength. The men necessary for the increase come from the first reserve; their arms and necessities are stored with the regiments, and the extra armament for the artillery is in the gun-parks. Soldiers complete their service with the colours on the 15th of October, the recruits joining on the 1st of November. The first fighting line may be calculated at 70,000 men, the first reserve at 100,000, and the National Guard at 130,000, making a total of 300,000 men ready to fight for their country.

For increase to the war establishment, a complete equipment of arms, clothing, and necessities is kept ready for issue at each regimental and battery store-room, the shelves in which are so divided, that the tunics, trousers, caps and fatigue dresses of every two soldiers are kept separate, each one's name and number, together with his size-roll, and the village from which he has to come, being ticketed on the shelf. The arms and boots are also stored ready for use. The batteries are raised from four to eight guns.

Their system of mobilisation is as follows: a recruiting officer is stationed at the dépôt of each military division; he has the name, description, and address of every reserve man printed on separate cards, and arranged in packets for distribution at each village by the mounted gendarmes. On receipt of his card with orders, each reservist joins at once, he being perfectly aware at which barrack his regiment is quartered, as they never change. He is taken to the store and fitted out with the clothing and arms corresponding with his mobilisation card. So admirably has this system been found to work, that the whole army has been mobilised in three days. It is perhaps, hardly necessary to say that, to prevent accident, no reserve man is allowed to change his residence, or travel without a passport, which in his case, has to be recommended by the recruiting officer.

The extra horses for the artillery are obtained by requisition on the inhabitants, and are easily collected; each animal being examined, and if passed, valued, and paid for by a bill on government, this bill is redeemed at a later date, probably at the end of the war, when, should the horse be returned to the original owner, a rateable reduction is made from the fixed price; and as the Bulgarian government have proved that these bills are not mere promises, by having already taken up those issued during the Servian war, the system is popular. Requisitions for transport and cart carriage are carried out on the same principle.

The country is divided into three military divisions; (1) Sophia; (2) Philippopolis; (3) Shumla. Each division consists of 4 infantry regiments of 4 battalions, one cavalry regiment of 4 squadrons, and one regiment of artillery of six Field and one Mountain battery. At Sophia, there are, in addition, the Prince's cavalry escort of one squadron, and one battalion of "Pioneers" of 7 companies.

The infantry are armed with Berdan improved rifles, and have the bayonets always fixed. They carry their own kit and camp equipage,

together with 140 rounds of small-arm ammunition. Without taking into account the weight of the rifle and bayonet, which together weigh 10 lbs., each soldier carries 47 lbs. They drill and manœuvre with a full marching kit, and, accustomed to the load, do not seem to find it excessive; the valise hangs very low, the principal weight falling on the hip; the great coat and blanket, when not in use, are carried rolled over the shoulder; and outside the coat is wrapped one-sixth part of a tent-d'abri. Sixty rounds of ammunition are carried in two expense pouches, attached to the waist belt, in rear of which hangs the entrenching tool; the remaining eighty rounds are in a bag, slung over the left shoulder, while a tin water bottle, with canteen combined, hangs from the right.

The dress of officers and men is very similar to that of the Russian army. The soldiers wear, in full dress, a sheep-skin cap, with badge and Bulgarian cross in front, a dark green double breasted tunic, trousers of the same colour, tucked into high boots reaching to the knee and bandages over the feet in place of socks. In undress, a cloth forage cap is worn. In summer the dress is of white canvas, and forage cap with cover. The cost of the man's total kit and necessities is 75 francs, including the fitting and making up which is carried out under the supervision of commanding officers. On the march, the men wear their sandals and sheep-skin, and carry their long boots on the valise.

The ration varies in kind to suit the season of the year; a monthly printed scale is hung up in each cook-house by the side of a black board; the officer on duty in each battalion calculates, on the board, the total amount of each article of supply required for his men, and signs his name to its correctness; previous to the issue of the cooked ration, he tastes and examines a sample. The ration consists of bread and coffee in the morning, a midday meal of bread with meat and soup, in the evening a bread and meat supper; on Sundays wine is added. The soldiers sit down to their meals in uniform, the non-commissioned officers eating with the men. Their grace consists of the Lord's prayer, and a short prayer for the Prince, which is sung, the men standing up.

There is little or no crime; the proportion of sick in hospital is small, disease usually incidental to European garrison towns, hardly exists. The soldiers seem happy and contented. Their physique is fine; average height 5 feet 8 inches, and the men are very level. The officers are paid as well as in the British army, but the men receive only one franc per month as tobacco money. The non-commissioned officers, who are allowed to extend their service with the colours up to 10 years, receiving a small pension on discharge, can, however, earn pay up to the large sum of 60 francs per month.

At each garrison town there is an Officers' Station Mess where dining is compulsory; it is very complete, with reading-room, library, billiard-room, &c. They pay a monthly subscription of 7 or 14 francs, according as they are over or under field rank. The Regimental Staff consists of a Commanding Officer with an Adjutant, Paymaster, and Medical Officer. The Battalions are commanded by Majors, each

Company by a Captain with Subaltern under him. There is also a Medical Officer to each battalion, and two Staff-Sergeants, with a proportion of artificers and farriers. Each regiment keeps a band, which accompanies it into action; the colours are carried by the sergeants in the centre of the whole regiment.

The uniform of the cavalry and artillery is almost similar to that of the infantry; the difference being in the shape of the shoulder cord; the men wear long boots, reaching half way up the thigh. The cavalry are armed with Winchester repeating carbines, and a curved sword. There are no lancers. All officers and non-commissioned officers throughout the army carry revolvers. They are mounted on Hungarian horses; those I saw were in good condition, and the men rode well, being accustomed to horses from their youth.

The artillery armament is for field guns, Krupp 7.5 cent. and 8.7 cent., the mountain batteries are also Krupp 7.5 cent. of a much smaller pattern. The field guns carry two men on the axle, and three on the limber boxes; the sergeant rides, and these six men form the entire detachment to work the gun. The limbers are of iron, Krupp's pattern, each carrying eight boxes of five shell fuzed, the cartridges are in leathern cartouches, each of which holds five; thus, when in action, five shells, with their cartridges are brought up to the gun, and the detachments are saved constantly going to and fro after each round.

The artillery horses are Russian or country-breds, some of the former being very large, but as most of them were left by the Russians after the war of 1877, they are not likely to get remounts of the same description, but will have to depend upon their country-breds which are inferior for artillery purposes. To the English idea they all look rough. The harness is supplied by Krupp; it is in good condition, and looked very serviceable, being kept constantly in oil and dubbing, which has, however, turned it very black, and takes away from its smartness; they use pole draught and collars. There is no distinction between gunners and drivers, they are instructed in both duties.

Their turn out on parade was rough looking, but workman-like. There are six horses to a gun, and the men ride fairly well. The total number of rounds carried by the gun and its wagons is 202.

The drill season lasts from April to September, during which time the troops are always in camp undergoing a rigid system of drill, which lasts from 7 a.m. till 11 a.m. and from 3 p.m. to 5 p.m.

Every Regimental Commander sends to the Divisional Staff Officer, daily, a detail of the previous twenty-four hours work, which is forwarded, duly commented on, to the Minister of War.

Musketry is carried out during the first hour of every morning's drill; there is no deviation from this order, and, with a view to encourage a feeling of emulation, a card, showing a diagram of the day's shooting, is placed over each man's bed; thus his skill as a marksman is known throughout the barrack-room. Firing with Morris' Tubes is extensively carried out.

Recruits, as previously mentioned, join in November, and immediately commence their elementary drills, to which such earnest attention and

pains are devoted, that in proceeding into camp, in April, they are considered fit to begin the more serious work of field manoeuvres. Special attention is devoted to instruct the soldiers in placing themselves under cover whenever practicable, either artificial or natural. As the country of Bulgaria, except on its hill sides, is singularly destitute in the natural cover of hedge-rows, ditches and trees, no exertions are spared to train the soldier to take advantage of the stoneless loamy soil, over which he moves to put himself under the artificial cover, obtainable with the entrenching tool he carries on his back.

The last month of the drill season is devoted to a course of manoeuvres, in which senior officers command in turn, carrying out problems on the attack and defence of positions, which have been set by the Staff Officer of the district; and the result with field sketches attached are forwarded to army head-quarters. These manoeuvres were invariably attended by Prince Alexander in person.

All officers go through an annual course of lectures, which together with practical work in the field, is given by a staff officer especially detailed every year for the purpose. Qualification returns of officers are sent monthly to the Minister of War; those badly reported on are informed of the fact, and on the third occasion have to leave.

The Bulgarian army still remembers its late exploits with the bayonet when fighting against the Servians, and has great confidence in a hand-to-hand combat, in consequence the object of their present drill seems to tend to the aim of getting at their enemy. They commence their advance in the usual infantry attacking formation until the intensity of the enemy's fire compels them to seek for protection under cover, which they obtain with remarkable rapidity in the stoneless loamy soil of the country by the use of the half spade half trowel each soldier carries on his waist-belt.

The supports being under cover the advance is continued until the first fighting line arrives within striking distance of the enemy, when rising from the ground the whole line, supports and all, with bands playing the Maritza, and colours flying, make a rapid rush with the bayonet. In actual fighting the charge would probably take place simultaneously along the whole line and is likely to be successful against an enemy like the Servians, weak in fire discipline. Their own army is remarkably obedient even to the extent of saluting an officer before speaking to him under heavy fire.

The artillery and cavalry drill in the field every other day, remaining on parade from 7 a.m. to 10 a.m. whilst the afternoons are devoted to drills in the barrack square and lectures in the school-room, where models, sections of shells and fuzes, and the many diagrams of guns and equipment hanging from the walls prove the direction in which their instruction tends.

The undulating open hills so common in Bulgaria are suitable for cavalry manoeuvres, and this branch of the service, though small in numbers, is kept up to a high state of efficiency, especially in outpost and reconnoitring duties.

Whilst I was staying at Shumla, one night at ten p.m., the officer commanding the cavalry regiment unexpectedly received telegraphic

instructions to move out with his regiment to reconnoitre the road and railway towards Rasgrad, which was in the supposed occupation of an enemy, to threaten his line of communication and blow up a certain railway bridge. I only mention the fact in proof that the Bulgarian army is a working one and is ready to act on emergency.

No one travelling through Bulgaria can avoid remarking the strong national feeling that exists amongst the peasantry, and the calm indifference with which they seem to disregard the present state of affairs at Sophia.

On talking politics to the people I casually met at the small roadside inns and baiting places where I happened to stop, I invariably found that they had quite settled in their own minds that Russian intervention was not to be, and that their future was secure now that a prince sat on the vacant throne. The national Bulgarian stubbornness came forward very prominently; they had formed their own opinion and would listen to no other, refusing even to argue on the subject. Stanbouloff has entirely won their hearts, they place implicit confidence in his actions, and as the leader of their national assembly are prepared to follow his guidance at any risk. The army also is a very strong loyal element and exercises considerable influence over the agricultural classes. The officers are to a man for the Prince, and strictly ant-Russian; they are well aware that a return to the old Doudakoff *régimé* means death to their ambition and advancement to the higher grades in the army. The private soldier looks up to his officer as a leader not only in the field and barrack room but also in politics, so that they also hold the same opinions. Every October 12,000 soldiers return to their homes on completion of their services with the colours; these spread loyal principles throughout the length and breadth of Bulgaria, repeating at their own firesides the sayings of their officers, embellished with the barrack-room idea of their own prowess and powers of resisting foreign invasion. With this element in full work it is not surprising that the national feeling I have alluded to is common throughout the country. The officers also at their mess tables talk politics and are inclined somewhat to boast of the power of their army, comparing it to those of the weaker neighbouring states; they, too, chat in the cafés with their civilian friends whose commercial interests being equally at stake in the independence of Bulgaria, warmly espouse their military brethren's belief, and would prefer risking an appeal to arms rather than submit to the interference of any of the powers who gave their country existence ten years ago. They ask the question: "Why should Russia interfere with us? Our country is well governed and prosperous. Look at our yearly increase of revenue, the number of new buildings that are rising in the suburbs of every town and village throughout the land. Look at our children, who with books and slates in their hands run laughing to school instead of playing in the gutter as in days gone by. We are a nation of progress, and for the further improvement of our resources only require rest and to be left alone. Regard the army, it is the most rising in Europe, the 100,000 soldiers we can place in the field are no raw conscript carrying arms they know not how to use. Much the reverse, they are a fine band of

young agricultural labourers accustomed to hardships and frugal fare, who to become soldiers have undergone a strict course of drill and instruction, who can march carrying their heavy kit thirty miles a day and fight at the end of it. They are led by officers who for the last eight years have made the art of war their one thought and study. Some of them may be young to hold the important position they do, but they are full of energy and have confidence in their own capabilities as leaders, and we also have confidence in our army, and as a nation will stand in the strength of our own arms, and in the knowledge of the justice of the cause we espouse, knowing that the god of battles is the God who grants protection to a just cause."

From my own personal observation, I agree with them and think that the Bulgarian army would be found tough customers to meet with in a fight, and that, man for man, they would hold their own against a more veteran army.

Bulgaria depends entirely on foreign markets for her necessaries, and naturally looks to Austria for the greater portion of her requirements. Thousands of tons of merchandise float yearly from Vienna to the towns on the Danube, whence it is carted far into the interior; and this trade will, on the opening of the Belgrade-Sophia line of Railway next year, be largely increased. England also trades direct with Bulgaria. Liverpool steamers with cottons and dry goods run to Varna hastening back with full cargoes of grain.

The extension of the railway from Yamboli to Burgas will also increase trade and open the fertile valley of the Tundja river, where the prospects are at present interfered with by the heavy import duties at Stamboul, which are so great as to be prohibitory to Bulgarian exports. -

In her own commercial interests Russia cannot but view with an envy, perhaps not altogether unreasonable, the possession of this highly important and increasing trade by nations who neither spent money nor assisted in the emancipation of Bulgaria. Russia considers it her right, and will, if allowed, divert the whole to St. Petersburg. But will Austria permit this? The opinion throughout Bulgaria is No! Neither is it probable that Roumania, after her bitter experiences and losses in the last war, will again grant a Russian army free passage through the heart of her territory. The Emperor would scarcely attempt to force his own way through, with Austro-Hungary threatening his right flank. I am of opinion that Russia will never again attempt the invasion of Bulgaria westward of the town of Silistria. Varna and Burgas are the only vulnerable points on the coast, and how would she feel with an Anglo-Italian fleet in the offing. It would be too hazardous for even Russia's bold policy.

The safest and probable course would be to cross the Danube at Galatz and to advance an army through the Dobrudscha against the quadrilateral of the Rustchuk, Rasgrad, Shumla, Varna defences, in which case the great battles which are to decide the fate of Eastern Europe will be fought out in the country about the Rustchuk-Varna Railway.

Bulgaria could never expect to stand alone against the enormous

strength and resources of the Russian Empire, but the fact that the interests of other nations are involved with hers and are indeed the very causes of her existence, is well known to every Bulgarian. All regard Austria, England and Italy as the three European powers to whom she may rightly look for more than support, and personally I sincerely trust the Bulgarians may be right in their anticipation of aid.

Three such strong nations combined would ensure peace, and the country instead of again becoming devastated by the horrors of war and the recurrence of fanatical atrocities which shocked civilisation in 1877, could securely enjoy the fruits of her past years industry and the advancement due to her labours. To her the attainment of this rest and tranquility is essential. Let us suppose that Russia decides to enforce obedience, and to this end thinks, as I do, that the only practicable line of attack is through the Dobrudscha, and then look and consider the situation. Russia's troops are massed on the Bulgarian frontier; with her base of operations on the Pruth.

In opposition, an Austrian army coming down the Danube has taken its position on the banks of the Lom between Rustchuk and Rasgard; an Anglo-Italian army supported by their fleets have landed at Varna and extended northward towards Shumla Road Station on the Railway with the Bulgarian army connecting those of the allies. I would ask any strategist if this line would not be almost impregnable. Russia with the two million troops at her disposal must shrink from the attempt.

A very large force of Russian dragoons are at the present moment being massed on Austria's Silesian frontier, which points to the fact that there is also a route to Constantinople through Vienna—perhaps the next attempt will be made from that quarter.

Amongst foreigners it appears to be quite a foregone conclusion that the great struggle for the supremacy in the East between Russia and England is only a question of time, and that England is the lamb that is to be devoured by the Russian wolf. The possibility of England commencing war and attacking or harassing Russia is never even suggested, much less discussed. On the contrary, it is always Russia that is to do this or that. "She will take Herat." "She will lay a line of railway from the Caspian, &c., &c." I heard a great deal of this sort of talk during my travels, and on one occasion could not resist retaliating on a Russian who was holding forth to an admiring audience of my fellow passengers, by saying: "Before you talk about placing a million of men in Afghanistan for the invasion of India, you had better try to enter Bulgaria. Your empire will find the task quite difficult enough without thinking about India."

But it does not do to hide the light of our own confidence in our strength and resources under a bushel. Europe, European public, must know and feel that England has the stronger position, and that it is the peace party and the natural English antipathy to war and its miseries that have for long past prevented her forcing Russia to acknowledge the idleness of her boast. Stroke the British Lion and he will continue to smile blandly at the rest of the world, but rub him up the wrong way and he can show a dangerous pair of huge fangs,

and with his mane on end is no agreeable customer. If this great battle for supremacy is no mythical idea, and perhaps it is not, the present is a time well suited for the Lion to open his mouth and give a slight roar of warning to the Bear.

The state of affairs in Bulgaria gives us a great opportunity. Let us hoist our flag over the British consulate at Sophia and recognise the gallant young prince who has volunteered to Bulgaria a happy future. Let us take her by the hand and teach her how to become like ourselves—a great commercial nation. The friendship of a nation with an army of 100,000 men prepared to take the field, ready to throw herself in alliance with us, and oppose a Russian advance on Constantinople, is well worth securing. We should increase our trade and should retain to the end of time the prestige of having been the nation which settled the vexed state of Eastern Europe in 1887.

England's very existence in the East depends upon Russia being kept out of Constantinople and Asia Minor. True, through Lord Beaconsfield's far seeing policy, we are now in possession of Cyprus, which to a certain extent protects our trade through the Suez Canal, but even that would be in peril if the Russian flag were flying over the Bosphorus. Her force would at once be turned to the extension of her frontier in Turkestan. We must, therefore, have Turkey as an ally. We must have a Balkan confederation, of which Bulgaria should be the head, acting in concert with us, and then the strain will be removed, and England can feel confidence in, and friendship for, Russia. A firm policy now, and this important question will be satisfactorily arranged temporarily, if not for ever, and the European balance of power preserved for many years without having recourse to war, of which, with its horrors, the present generation has seen far too much. Bulgaria has a great future before her, and it seems a pity that Prince Alexander who led her so well in her infancy, should not be still at the helm to guide her to the permanent successful improvements for which she is striving so hard; but fate has decreed otherwise. There is no reason though, why, under her present Government, supported by the Powers she should not fulfil her destiny.

Now, on my way back to India, I look with much pleasure to my travels through this very interesting country. It has given me occasion for reflection, and opened my mind to professional subjects. I have seen a charming country which has remained hitherto unexplored by the generality of English tourists. It is a pity it is not better known to sportsmen, for bears and deer are to be found on the hill side, and small game, including snipe and duck, abound. Some of the drives through the Balkans and Tundja valley are lovely.

The idle hours on board ship have given me time to write, and I trust not uselessly, the few notes I collated for those who have not had the same opportunity of seeing and judging for themselves what Bulgaria now is.

Before bringing this to a close, I must say a few words in favour of that excellent institution—"Roberts' American Mission College on the Bosphorus." It was founded by Professor Roberts with the

intention of educating youths of Eastern Europe without distinction of religion. Forty young men are yearly taking advantage of this munificence, the largest proportion being Bulgarians. Some of the best men I met in that country were those who had been educated there. Why should not some English philanthropist try a similar experiment at Shumla.

UMBALLA,

November, 1887.

MOUNTAIN ARTILLERY.

BY

MAJOR E. J. DE LAUTOUR, R.A.

IN the present discussion on Mountain Artillery and its equipment, two points, distinct from each other, appear mixed up; one, the equipment of light guns employed on mountain service; the other, the equipment of the same gun, when used in countries not hilly. This second point I do not propose to touch upon; it opens out too wide a subject; the use of elephants, coolies, camels, the advantages of light over field guns, &c., &c. I propose to confine myself to the first point, namely:—The equipment of light guns employed on mountain service, and my argument is, that only those batteries that are equipped for service in mountainous countries should be called "Mountain Batteries" and that they should carry only those articles of equipment that are necessary for service in the mountains. Captain Simpson's plea for shafts, that they were useful in Natal and Egypt, where the batteries that used them had neither the equipment nor the establishment of mountain batteries, might be urged by anyone desirous of making Mountain Batteries, the depot, for anything, that had at any time, been found useful in the transport of light guns.

The proceedings of foreign mountain batteries are certainly interesting but hardly as instructive as those of our own service, if only for the reason, that of late years few nations have had the same practical experience in mountainous countries. A better acquaintance with our own records would not only prevent errors but also the resurrection of buried controversies. Though I do not object to the reappearance of old friends, yet I cannot forget having seen them before, and there are few points now brought forward that have novelty as their recommendation. The Abyssinian shaft I saw tested shortly after the Abyssinian war in a march of over a hundred miles. A blanket under a pad, an idea borrowed by Captain Simpson from the Austrians, I saw used in 1863, it was well known then as a remedy for careless work in the collar-maker's shop. The battery had been for about six months on service and the stuffing had to be entrusted sometimes to inexperienced drivers, otherwise there would have been no thought of using it, as a pad properly stuffed requires neither blanket nor numnah.

Headsticks, denounced as relics of antiquity, I saw brought into use by a commanding officer at his own expense, for, after being quartered one winter alongside a battery that used them, he found their bill for repairs to blankets so much less than his own, that it paid him to do so. A headstick properly tied answers its purpose well.

The equipment of Mountain Batteries has been well tested and is good enough, and when the new organisation has had time to work, and Majors are taken from men who have served their apprenticeship as Captains, and Captains from those who learnt their work as Subalterns, we shall hear less of faulty equipment and more of the need for improving mountain ordnance, and the mountain battery mule. An

error very prevalent in India, namely, that the old equipment was lighter than the new and that the regulation weight of a mule load is the maximum weight a mule can carry, has, I see, found place in the interesting paper on Mountain Artillery published in the May number, R. A. I. Proceedings, pages 197, 198. This is, however, far from being the case. The old 3-pr. S.-B. gun weighed 252 lbs., against the present ordnance of 200 lbs. weight. The old pattern wooden ammunition box, empty, weighed 50 lbs. against 35 lbs. the weight of the new pattern leather one; similarly, the improvements in harness and saddlery have been in the direction of lightness.

What really fixed the present regulation load was, that more mountain batteries were raised than the country could supply with mules of the old stamp, so that the standard of weight carried had to be lowered. Hence it is that the present mountain battery mule, an inferior animal, is accepted, not only as a type of what a mountain battery mule ought to be, but as a type of what he used to be, when batteries were so few that they were able to select the mules they found best fitted for the service.

With regard to field movements, I think nothing can be more pitiable than to see a Mountain Battery wasting the drill season in practising parade movements in the plains, and as Mountaineers are noted in all countries for their carriage, any want of smartness in Mountain Battery gunners must be, I think, traceable to some other cause than "Hill Marches." The men of the last mountain "screw gun" battery that I had the pleasure of seeing (it was in 1886, and the battery had, I think, much the same equipment as the one encamped with me in 1879) were very smart indeed, but then they were commanded by an officer of some twelve years' continuous Mountain Battery service. I attach a table of measurements taken fifteen years ago, as it might interest some of your readers; it will be seen that "girth" and "wither to croup" measurements give valuable indications of the power of an animal.

Table of Measurements of Mountain Battery and Infantry (Baggage) Mules.

(August, 1873).

AVERAGES.	HEIGHT.	GIRTH.	BELOW KNEE.	WITHER TO CROUP.
<i>Mountain Battery.</i>				
Average of all the Gun and Carriage Mules	hds. ins.	inches.	inches	inches
" " 8 Box Mules, taken as they stood on the lines ...	13 3-73	63-44	7-23	32-33
" " 8 Box Mules, taken as they stood on the lines ...	13 3-26	61-22	6-93	32
<i>Infantry Baggage Mules.</i>				
Average of the 2 best Mules in the 100 Baggage Mules } of one Regiment, selected by the man in charge. ...	13 2-41	60-1	6-72	32-6
Average of the 5 best Mules, ditto, ditto	13 2-91	60-1	7-05	32
" 4 Mules taken as they stood on the lines	13 0	58-61	6-6	30-58
Average of the 2 best Mules in the 100 Baggage Mules } of another Regiment, selected by the man in charge ...	13 1-82	59-37	6-89	30-5
Average of the 5 best Mules, ditto, ditto.	13 2-1	59-25	6-92	32-7
" 6 Mules taken as they stood on the lines	13 0-89	57-58	6-58	31
<i>Increase in height and girth of young Mules.</i>				
Average of 5 Mules aged 3 and under in 2½ years	inches.	inches.	—	—
" 7 " " 1½ years	87	1-42	—	—
" 7 " " 1½ years	1-32	1-63	—	—
" 8 Mules under 5 and over 3 in 2½ years	72	1-55	—	—

MOUNTAIN ARTILLERY.

BY

CAPTAIN E. A. SMITH, R.A.

CAPTAIN WHITE, in his reply to Captain Simpson's criticism, invites a discussion on Mountain Artillery, and, I think, anyone who has the interest of this branch of the Regiment at heart, would do well to put in a word.

If Mountain Artillery is to be recruited from either branch of the Regiment, why not from Field Artillery? Thus in case of an European war, drivers would become drivers, and gunners, gunners. Personnel.

Allowed that the Mountain Artillery gunner should be a strong man, and over average height, but not a heavy one. A wiry man of average strength can do the lifting work required in Mountain Batteries perfectly well; he will get up a hill with half the ease again of a heavier man, and in far better wind. And what do we want in the Artillery? 1st, good shooting; 2nd, ability to come up fresh to the position in which we wish to come into action.

The Officers should also be recruited from the Field Artillery, and should have served at least two years in Field Artillery, so as to understand something of stable management, veterinary, and care and fitting of harness.

No one except the Officers and the Staff Sergeants should be allowed to carry pistols—a most dangerous weapon in the hands of an uneducated or excitable person. Pistols.

The sponge-staves and lifters, with the exception of the muzzle handspike should be carried by gunners and not strapped on the saddles.

The short sword (Trumpeter's, brass hilt, as worn in Native Mountain Batteries) and the Hazara Mountain Battery pattern belt should, I think, be the equipment. The present Sam Browne belt has too many buckles and D's, and is always going into the collarmaker's shop for repair. The cross-braces which are in India issued stitched at the back, have always to be refitted, might be left plain, and a spare stud issued so that with a stud-hole in each brace where they cross might be properly and neatly fitted under Battery arrangements. Swords and belts.

The Division being the tactical unit of the Battery should be quite independent, and should have artificers accordingly. I consider it is absolutely essential that there should be a shoemsmith with each division, who should know something of veterinary: how to give a ball, sew up a wound, and understand treatments for ordinary wounds and cases, as well as how to keep down the mule's feet, and shoe a pony when required. Artificers.

Mules.

There is a tendency to run to size for ordnance mules. So long as the mule is well up to the weight, the lower the animal for gun or carriage the better—the easier it is to lift off the weights on coming into action. This is especially felt in uneven hilly ground, or on a slope. There are plenty of 13.3 mules to be found well up to the work, and I think that an order that gun and carriage mules should not exceed 14 hands would be advisable. The wheel mule may with advantage be high, as she will often enable the wheels to clear obstacles, boulders, or go through a narrow pass rising sheer, where with a lower mule one would have to halt and unship the wheels.

Baggage
Mules.

I agree with Captain White that baggage mules should be part and parcel of the battery. The efficiency of a battery very greatly depends on these mules being well up, and they should therefore be exercised *always* with the battery on drill, as well as marching order for exercise, stabled and groomed at the same place and time, and in every way be looked upon as one of the most important factors in the battery. Their muleteers, drivers, or whatever they are termed should, in the same way, be enlisted, clothed, paid, &c., in the battery, and be entirely distinct from the Transport Department. With 12 mules per division, a Native Battery of six guns can move anywhere, provided the Commissariat make arrangements for food and tents, if the latter are to be carried.

The mule is essentially a pack animal, and can carry the loads required of it quite well. I submit that (as fed by us) she requires the exercise she gets in a Mule Battery, and that it is positively injurious for her not to get it. Therefore until a number of mules are *hors de combat*, the necessity for draught does not appear. Should occasion arise, it would be simple to make such wheel and shaft arrangements as would relieve the necessary number of mules. A few rope traces might be carried as surplus stores, say, on the 2nd box mule, over the boxes.

Captain White seems rather to overlook the fact that the wheel mule, though one of the biggest and quickest in the battery, should be kept as fresh as possible in case of emergencies, and the load (wheels) is a trying one, though lighter than gun or carriage, owing to its coming more on the ribs than any other load in the battery; but I shall refer to this later on.

Gun.

In my opinion the jointed gun of 2.5-inch calibre is no mountain gun, and the sooner a jointed howitzer of large calibre (3.5-inch or 4-inch at least), be issued the better.

A carriage for such a piece could, no doubt, be devised on Major Clavarino's design, but that presents several objections, chiefly rib-pressure and sticking out at the side, and below the mule's belly.

As regards what Capt. White says about Capt. Birch's carriage, I can see no objection to a carriage toppling over. Its motion does not commence till after the shell has left the muzzle, and has no effect on the flight of the shell. A smart detachment can always prevent this "toppling" over happening. I have seen my own carriages (7-pr. 200 lb.), "fielded" over and over again in bad ground, both in Jawaki and Afghanistan. Preventor ropes can be used for the same

purpose. I own to a weakness to see Capt. Birch's carriage fairly tried in the hills.

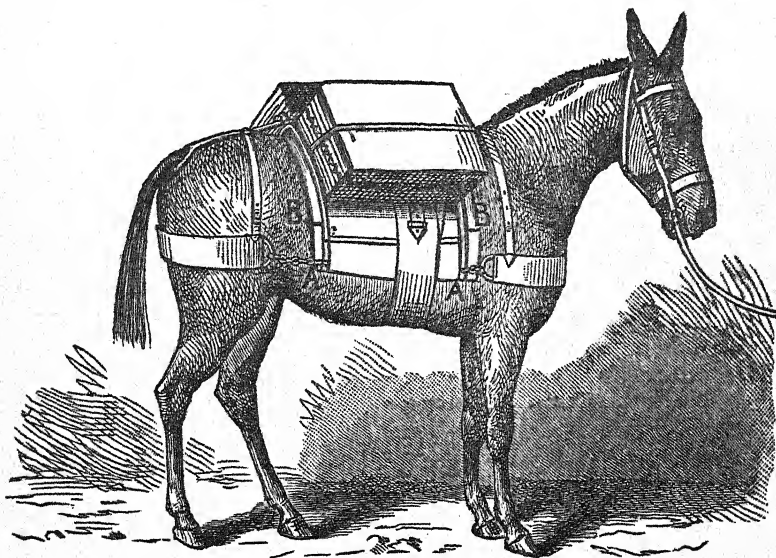
I agree with Captain Simpson that the 2nd box mule should be in the 1st line, thus with a shell of 12 lbs. each gun could have at least 20 rounds at hand.

I contend that the present bits are all that is required—the Port-^{Bits.} mouth for a "brute." This snaffle will hold eighty mules out of a hundred. The new leather leading rein with stops does away with the bridle and leading rope.

I consider the crupper to be a *sine quâ non* with our present saddle. ^{Crupper.} With a maximum of hill-work and tight cruppers, I have seen very few galled docks, and am certain until we improve our saddles we cannot do away with our cruppers.

The saddle is quite wrong in design. It should be much deeper in ^{Saddle.} the frame, so that the breeching and breast-piece might lie almost in a continuous line, from point of shoulder to under the quarter of the mule, *see* Fig. I. Look at the Persian or Cabuli pack mules, that

FIG. I.



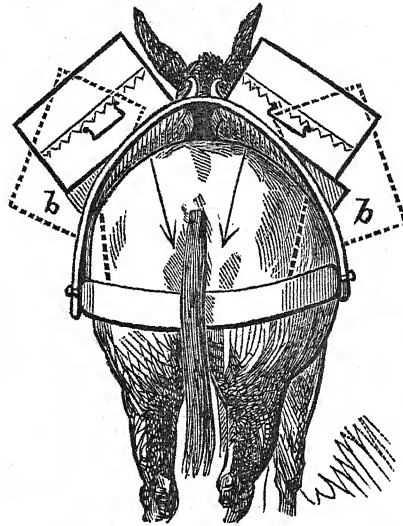
Deep saddle with points of adjustments of breast-piece and breeching where they ought to be, A A. Where they *are*, but should not be, B B.

are for ever up and down hill with the loosest of girths; their breechings and breast-pieces are worn tight, and in a continuous line; their paitans are not nearly so well stuffed or ventilated as our saddles, and they rarely produce sore backs.

I cannot speak from experience, as we do not use steel-framed saddles; but believe it would be well worth a trial to have a set of saddles made of really good metal. I don't think the saddle would weigh more than the present one, if properly made.

The lie of the loads, boxes, baggage, &c., is wrong, and should be thus—Fig. II.—to get the weight clear of the spine, and get off the

FIG. II.



ribs as much as possible; this could be arranged by wooden or metal wedge-shaped battens *b b*.

The dotted lines shew where the pressure of the loads come now. The arrows where they should come.

I notice that the Shans and Kachins tighten up breast-piece and breeching in the same way as the Afghans and Persians, so that they lie in one continuous line. They also use a crupper and wear it *tight*. One man drives from 7 to 10 mules, and a rubbed or galled mule is a rarity with them.

BHAMO,

May, 1888.

COMBINED ACTION OF FIELD ARTILLERY AND MOUNTED INFANTRY.

BY

CAPTAIN C. H. HERRING-COOPER, R.A.

THERE is little doubt that our Field Artillery is better horsed and in other ways more mobile than the Artillery of Continental armies.

Unfortunately, under existing conditions, the rate of movement of Field Artillery is so dependent on that of Infantry, that this superior mobility cannot be turned to account.

It will be my endeavour in this paper to briefly show how it might be made of use, and what important advantages might be gained therefrom.

ATTACK.

Let us first glance at the functions of Artillery in attack.

It is generally acknowledged that in opening an attack on a position, the Artillery should be pushed forward so as to come into action in line with the Artillery of the advanced guard. The question of the ability of the Artillery in such a case to hold its own against Infantry fire, although itself unsupported by Infantry, has given rise to much controversy. I will not discuss the point, but merely say that there is little doubt that the losses of the Artillery would be much diminished if it *had* the support of Infantry, who advancing to the front would keep the skirmishers of the defence at a respectful distance, and thus allow the Artillery of the attack to devote itself to overcoming that of the defence. By the use of Mounted Infantry this support could be ensured, and the Artillery could be pushed up to the front in the manner advocated.

The attack would be carried out somewhat as follows:—

Previous to opening the attack, the Artillery commander, accompanied by range-finding party, should advance with the Mounted Infantry and select the ground on which to place his batteries. The ground being selected, the Mounted Infantry should dismount, and leaving their horses under cover, advance in open formation about 400 or 500 yards to the front. The principal ranges should be taken in the meantime, and the batteries brought into action, as soon as their front is clear, so as to enable them to open fire without any delay.

(I may here remark that it would be a great advantage to the Artillery commander if he had his own range-finding party, irrespective of the battery range-finding parties).

The Artillery of the attack would now engage that of the defence.

As soon as the Infantry arrives on the scene the Mounted Infantry should retire, their mission being fulfilled. On retiring they should concentrate within easy reach of the General Commanding, remaining under cover as much as possible. They would then be available for any other service that might be required of them.

It need hardly be said that to employ Mounted Infantry when ordinary Infantry is available, would be an utter misuse of the Arm.

FLANK ATTACKS.

The difficulties attendant on a front attack, will, in these days of machine guns and magazine rifles, be greatly enhanced, and now more than ever will victory have to be sought for in the successful issue of flank attacks. But against a capable adversary the flanking force would most probably find that when its attack was developed the difficulties to be overcome would be nearly as great as if a front attack had been made in the first instance; the defenders taking up position for defence much quicker than the assailants could form for attack, and also owing to the immense advantage that troops armed with magazine rifles and acting on the defensive would have, being able to denude their front to a great extent, so as to meet flank attacks.

Under such circumstances the commander of flanking force would naturally seek to prolong his front so as to outflank the new front formed by the defenders, and to threaten their communications.

Unfortunately under existing conditions the chances of success of such a manœuvre would be small. The Artillery and Infantry, necessary for the turning movement, would have to make so wide a *détour*, that in consequence of the slow rate of marching of Infantry a very considerable time would elapse before they came into action. The defenders would have ample time to meet and to check them, and perhaps by a counter stroke to cut them off from their main body.

Such an extension of a flank attack to be carried out successfully should be performed by mobile Field Artillery supported by Mounted Infantry, the whole being masked by the entire force of Horse Artillery and Cavalry. This "Turning Force" owing to its mobility would work round rapidly to its position in advance of the outer flank of the "flank attack," while that attack was being developed. The attention of the defenders being occupied by the attack threatening their flank, and the rapidity of movement of the "Turning Force," would give that force every opportunity to establish itself without serious opposition.

Once established, the flanking fire of its powerful field guns, supported by riflemen, on the defenders new front, and the threat to his communications, would have a great moral effect, and if the troops composing the main flank attack then pushed on vigorously, the position ought to be carried. For the abovementioned "Turning Force" to do effective work, its Artillery ought to consist of powerful long-ranging field guns, supported by Mounted Infantry. The outer flank to be

covered by Horse Artillery and Cavalry, who would screen the advance, and by threatening the communications, would draw off and engage the Cavalry of the defence.

The *rapid* prolongation of front of a flank attack is without doubt of the most vital importance, and success will remain with the commander whose force is so organized that such a movement is practicable. It must be remembered however that success depends on *rapidity* of extension.

DEFENCE.

In the defence of a position the joint action of Field Artillery and Mounted Infantry would also produce important results. Counter flank attacks by such a force could be delivered with a rapidity quite unattainable under present conditions. The prolongation of front of a flank attack could be met and checked, and the assailants' communications threatened.

In the operations of an advanced or rear guard, the seizing of bridges, fords, defiles, &c., the advantages of joint action of Field Artillery and Mounted Infantry are so obvious, that I need not dwell on them. A point that must not be overlooked, is that the movements abovementioned could be carried out with a precision, as regards time, that could not be expected from the slow rate of marching of ordinary Infantry. A commander is therefore enabled to time his movements with an accuracy that would be invaluable.

TRAINING.

As the Artillery and Mounted Infantry under above conditions, would, when on active service, be so closely connected, it would be an immense advantage to each that they should be brought in contact during times of peace. I would therefore suggest that men who have passed through the Mounted Infantry course at Aldershot should go to the Practice Camps at Hay or Okehampton, or as an alternative, should be taught riding at those camps instead of at Aldershot. They would there take part with the Artillery in field firing under conditions similar to those of actual warfare. Advancing to the front of the flanks of the Artillery, they would open fire on hostile Infantry skirmishers represented by dummies at unknown ranges, whilst the Artillery engaged Artillery. They would cover the advance or retreat of guns changing position, &c. By thus working together, mutual confidence would be gained, and the chances of success on the battlefield would be greatly increased.

¹ It is much to be regretted that the different Arms of the Service do not know more about one another's efficacy of fire. This is owing in a great measure to the fact that although these Arms manœuvre together on field days, their connection ceases as soon as shells and bullets are substituted in guns and rifles for blank ammunition.

Batteries march away from Aldershot to Hay or Okehampton to

¹ The following remarks were written prior to Appendix A to Regimental Order, No. 80, of 1888.

carry out their practice, but nothing is seen of this practice by the Infantry. Infantry carry out field firing, but nothing is seen of this firing by the Artillery. The only rifle shooting that an ordinary Artilleryman knows of, is the target practice carried out at a known range.

Unfortunately, on active service the Artillery are expected to have confidence in the fire of their Infantry, and Infantry to rely on the fire of their Artillery. The two Arms are expected to work in unison, although each is more or less ignorant of the capabilities of the other. Real unison is impossible under such conditions. The natural consequence being that each Arm "plays for its own hand" without thinking of its partner. Whist players know the consequence of such play.

If the Artillery and Mounted Infantry are to act together in the manner I have endeavoured to point out, they must see something of each other in times of peace, each getting to know the capabilities of the other, relying on the strong points, and learning how best to cover the weak.

To sum up; we possess an extremely mobile Field Artillery and first rate material for Mounted Infantry. In conjunction with Mounted Infantry, the fullest advantages will be derived from the mobility of our Artillery, and it is in such a combination that the most useful qualities of Mounted Infantry will be displayed.

GUERNSEY,

July, 1888.

PRÉCIS
AND
TRANSLATIONS.

“REVUE MILITAIRE DE L'ÉTRANGER.”

15th APRIL, 1888.

BY

LIEUT.-COL. J. H. G. BROWNE, LATE R.A.

VERTICAL SHELL FIRE AGAINST FIELD FORTIFICATIONS.

THE Germans have had under discussion from 1885 to 1887 the question of vertical shell firing against field fortifications. The officer who has gained the prize is Major Leydhecker, belonging to the Staff of the Inspector-General of Field Artillery. His Essay is entitled “Das Wurffeuer im Feld und Positionen kriege insbesondere beim Kampfe um Feldverschanzungen.” The position of the author and the distinction with which he has been treated lead us to suppose that his ideas embody those which are prevalent in high quarters. For this reason they appear to us to be worth analyzing.

I.

During the War of the Secession the insufficiency of direct fire against earthen fortifications had often been proved. The great battles of the wars of 1866 and 1870 turned people's minds against the old ideas. Again, the absolute impotence of the Russian Artillery against the Plevna redoubts excited general astonishment. A new light suddenly sprung up and it was perceived that heavy long range guns did not answer to all the requirements of war. It was absolutely necessary to re-introduce the vertical shell fire, which had been totally neglected for the last ten years.

The garrison artillery started without hesitation on the new track. Mortars and rifled howitzers were built and great modifications were introduced into the composition of siege parks and the armament of places. But the field artillery, with exception of some isolated cases, has hitherto resisted the tendency. There is a fear of diminishing the simplicity of its armament and ammunition. The Swiss artillery alone has a piece of position, a mortar of 12 centimetres, which allows of vertical shell fire; and yet there is no doubt that field entrenching will be made use of in the wars of the future. Past experience renders it inevitable.

It is sufficient to mention, with regard to the last thirty years, the works thrown up by the Russians at Sebastopol, by the Austrians at Somma-Campagna and Chlum in 1866, and above all by the Americans in the War of the Secession. The commanders of the two sides considered a simple entrenchment, covered by abatis of trees or by other accessory defences, and defended by two ranks of riflemen, as an obstacle absolutely impregnable in front. If this conclusion, the result of four years of war, was true with the old slow-firing weapons, it must be so *à fortiori* with breech-loading and repeating rifles.

On the 18th of August, 1870, the German army saw all its efforts fail against trenches of a much weaker profile than those of the American War, or of Plevna. They did not succeed until they had turned the French right. There was there the *Corps de Armée* of General Canrobert, who however, as General Brailmont remarks, from the want of an Engineer park, had only been able to throw up some unimportant shelter trenches in front of St. Privat.

The Danes made a large use of field fortification in 1864, but without success. Their defence was too passive, because their "moral" was weakened, and their armament too inferior to that of their adversaries.

Major Leyhecker estimates that, in the case of a European war the German army, being mobilized more rapidly, would find the French and Russians upon the defensive in fortified positions. He sees an indication of our disposition in the great number of our Eastern fortifications, and an evident demonstration of the disposition of the Russians in the existence of guns of 10.67c. which form a third of their field artillery. It appears that these guns are so heavy that they are more suited to the defensive than the offensive. We will not discuss these arguments as we do not wish to stray into collateral questions, but it would be easy to give good reasons against them.

If we consider, says Major Leyhecker, the profiles of the entrenchments used in France, it appears that a man seated on the step of a finished shelter trench, may be struck by a projectile coming with a minimum angle of descent of 21 degrees. In the case of hasty breastworks this minimum angle of descent becomes $27\frac{1}{2}$ up to 45 degrees, consequently the ordinary shell fired by field guns cannot produce any effect, because at a range of 4000 metres their angle of descent is 20 degrees. It is worth remark, by the way, that with the French guns an angle of descent of 20 degrees is only obtained at 5,100 metres for guns of 80 millimetres, at 5,000 metres for those of 90 millimetres, and at 5,900 metres for those of 95 millimetres.

With shrapnel, circumstances are more favourable; although at 1000, 2000, and 3000 metres the angle of descent is $24\frac{1}{2}^{\circ}$, $6\frac{1}{2}^{\circ}$, $12\frac{1}{2}^{\circ}$, yet the lower limit of the cone of dispersion strikes the ground at angles of $10\frac{1}{2}^{\circ}$, $16\frac{1}{2}^{\circ}$, $23\frac{1}{2}^{\circ}$. Practically, however, when near the limiting angle the target is but little exposed on account of the dispersion of the bullets, and the difficulty which is found in regulating the height of bursting with exactness.

The more oblique the fire with reference to the target, the smaller becomes the limiting angle of descent. Particular cases of this kind should be sought for, but they are not common, and no general theory can be built up upon them.

Field artillery is then powerless to prepare for the attack of infantry entrenchments. The defender may let it fire away at his ease; he has only to sit on the banquette with his back to the parapet and wait, in order to stand up and fire, until the assailant is in movement. The closer the attacking artillery follows its infantry, the less effect it will have upon the target.

Practice is here in accordance with theory. At Plevna an incessant bombardment carried on at first with field guns and afterwards with heavy guns, only succeeded in interrupting the works of the defence during the day time. The daily loss of the Turks may be estimated at 50 to 60 men, that is to say, a whole battery had to fire all day in order to put one man *hors de combat*. At Gornji-

Dubniak 4000 men and four guns, observed by 20,000 men and cannonaded for six hours by 60 guns, brilliantly repulsed a first assault, inflicted a loss of 3300 men upon the Russians, and only gave way at night-fall because they were not supported. The artillery failed in a similar way at Telisch, where 56 guns firing continuously for nine hours on five battalions all entrenched, inflicted no losses on the men and did no serious damage to material.

These facts were systematically studied from 1877 to 1881 in the Russian Military Schools, and the conclusion has always been the same. Defenders seated with their backs to entrenchments of a profile like ours, are absolutely sheltered from the direct fire of field guns.

Heavy long-range cannon do not present any advantage against a hidden target, because their angle of descent is less than that of field guns, so that with these heavy guns the dead angle behind the parapet is more extensive. Their weight does not allow of their being brought rapidly into action, and of counting upon their entry into line at the right moment. Moreover, one cannot dream of destroying earthen entrenchments with guns of small enough calibre to be carried in the field. There is therefore no proportion between the increase of power obtained by these guns, and the difficulty of bringing them into action, providing them with ammunition &c., &c. Moreover there is little use in the destruction of a parapet, which in itself does not cover the infantry from assault, and which is only valuable for the fire of its defenders. This fire has to be subdued, the reserves have to be crushed before they can come into line; and all the long range guns, heavy or light, are equally powerless for that purpose.

As General von Sauer says, vertical fire is the only one which does not recognize any dead angle. If the invention of rifled cannon had reached perfection at once, if howitzers and mortars had been rifled like long range guns, vertical shell fire would never have fallen into discredit, and a field artillery would never have been created which was totally deprived of it. Vertical fire would have been tried before Plevna. Major Leydhecker compares an attack prepared by direct fire with an attack preceded by vertical fire executed by artillery.

"In the first case, at the moment when our infantry extends for attack, the defender is almost intact, ready to receive them with his fire as soon as they have advanced into the zone of effective range. He possesses an artillery whose guns or perhaps whose gunners only, he has temporarily withdrawn under cover, but which remains ready to use as soon as the assailant changes his position or moderates the intensity of his fire."

"Up to the moment when the defender crowns the parapet, our artillery has a poor effect; from that time it can see the defender's heads. The time during which it can aim at them is short, for soon our infantry will mask the target. It may be said that this inconvenience will arise still sooner if we are firing shrapnel instead of common shell, for the dispersion of the bullets will force us to stop shrapnel fire as soon as our infantry arrives within 400 or 500 yards of the enemy's line. Suppose that the infantry of the defence shows itself when ours has arrived at a good range from the position, say from 700 to 800 metres, there will remain only a space of 400 metres, whose passage can be assisted by our fire. Beyond that, every kind of artillery fire against the parapets must be forbidden us, and we must confine ourselves to retarding the arrival of the enemy's reserves by increasing the range of our shrapnel—that is to say we shall always have to fire over the heads of our infantry as they advance to the assault." We would wish Major Leydhecker to observe that all this assumes a number of hypotheses which will not always be realised in practice. For instance will the defender always be able to withdraw his guns and place them under shelter? Cannot he conceive an attack carried on with such vigour that the different phases of the combat have no time to develop themselves in the order laid down?

"The picture is entirely changed if we employ vertical shell fire. Our long range fire shakes the garrison and is carried on with the same vigour during the whole of the forward march of our infantry. Its effectiveness remains the same, whether the defender hides himself or shows himself. From the high angle descent, the scattering of the splinters is diminished. A slight increase in the burning length of the fuze and in the elevation, is sufficient to prevent any shell from bursting in front of the parapet, and to ensure that a sufficient number will burst immediately behind it." "If the attack does not succeed" continues the author, "direct fire leaves the men who are retreating exposed without support to the fire of the defenders, and that at the most critical moment. On the other hand vertical fire retains all its power and should render a pursuit impossible. Vertical shell fire is as necessary to the defence as the attack, as it furnishes the only means of reaching the gunners of mortar and howitzer batteries, who are concealed from view."

Short-range guns are especially necessary for a field army charged with the investment of a fortress. They ruin the works of the defenders, deceive them with regard to the real point of attack, facilitate and curtail the subsequent works. General von Sauer has pointed this out in his work on the attack and defence of fortresses. According to the experiments of the Schools of Gunnery, the comparative effect of long-range guns and of mortars is as follows. In order to put one man *hors de combat* in a battery of the usual kind 18 shell of 12-centimetres weight must be fired at 1300 metres range and 25 at 2800 metres. At each distance it is sufficient to fire 10 shell with the mortar of 15 centimetres; at 2400 metres the effect of the two pieces when firing shrapnel is in the proportion of 1 to 3.

II.

Vertical fire is a necessity. We have two means of obtaining it; the employment of reduced charges with the present field pieces and the introduction of special pieces, mortars or short guns.

Immediately after the invention of rifled artillery, the first method was tried, but the confidence which it inspired was not of long duration. The light shell of the field artillery sunk into the ground and remained buried there; few or none of them burst on the surface. All the great powers with exception of France and Austria¹ have given up reduced charges and trust entirely to shrapnel in order to strike a target covered in front.

When later on the employment of time fuzes made the bursting independent of the angle of descent, the question of reduced charges should have been taken up again. It was neglected on account of the exaggerated importance attached to shrapnel.

If it is wished to return to reduced charges, we should confine ourselves to dividing the normal charge into two or three equal parts, in order to avoid all useless complication. Or to be more accurate, as a charge divided into two or three equal parts produces a greater initial velocity than a single charge of the same weight, each part should be slightly less in weight than the third or half of the whole charge. Thus with the German 12-centimetre gun (C/73) firing at 2000 metres, the angle of descent is $11\frac{1}{2}^{\circ}$ or $13\frac{1}{2}^{\circ}$, while the angle of descent of the lower part of the cone of dispersion is $22\frac{1}{2}^{\circ}$ or $33\frac{1}{2}^{\circ}$, according to whether the charge is reduced to a half or a third.

The following table gives the shortest ranges at which defenders sheltered behind entrenchments of the kinds adopted in France can be struck by field guns.

¹ This is incorrect. France as well as Germany has given up reduced charges. Austria has retained them but appears to be dissatisfied.—*Ed., Revue Militaire.*

		Frontal fire.	Fire inclined at 45°
Finished Shelter-trench. ...	{ Whole charge	2,600m.	1,800m.
	{ Half "	1,700	900
	{ One-third "	800	450
Hasty Entrenchment. ...	{ Whole charge	—	—
	{ Half "	2,500	1,800
	{ One-third "	1,700	900
Hasty Entrenchment finished.	{ Whole charge	—	—
	{ Half "	—	3,000
	{ One-third "	—	2,000

"There is," says the author, "another means of giving a high angle of descent to the lower part of the cone of dispersion, viz., to increase the bursting charge or to place it at the point of the projectile. France has adopted the latter system in the construction of its new mitraille shell. We cannot approve of this arrangement. The cone is more extended, but at the same time more sparse. The advantages which these projectiles give in firing at hidden targets are largely counterbalanced by the dispersion of the bullets, by their loss of velocity and penetrating force. The action of the "obus à mitraille" is shallow in depth. The converse is the case with the German "shrapnel whose effect is not influenced by slight errors in laying."¹

Indirect fire with shrapnel is ineffective against entrenched troops, because it is easy to make bullet-proof shelters. The War of the Secession and the Russo-Turkish war have furnished numerous examples of this. More powerful pieces, either howitzers or short guns, must be used against field fortification furnished with splinter-proofs, and flanking and accessory defences. Thus, in the attack of a position fortified like Plevna, the redoubts must be subjected to the fire of mortars and howitzers, which would necessarily be few in number, and the shelter-trenches to that of field guns firing reduced charges.

Major Leydhecker's ideas upon the efficaciousness of reduced charges has not received as unanimous an approbation as his desire to see the adoption of new short range pieces. Lieut.-Colonel Rohne of the Artillery has combated them in the October Number of the "Archiv für die Artillerie und Ingenieur Offiziere," 1877. His objections may be shortly stated as follows:—

1. According to the law of probabilities a very feeble effect may be expected.
2. The regulation of the fire will be very difficult.
3. To have any chance of success, each battery would have to devote one day of its annual practice to firing reduced charges and must expend about 60 rounds more than the regulation allowance, for it must be clearly understood that on no account should there be any reduction in the number of shots appropriated to the practice of direct fire, which is the daily bread of artillery.

He concludes by affirming that the adoption of reduced charges would be a retrograde step.

Major Leydhecker continues as follows:—

None of the pieces existing in the German field parks are suited for field service. The most suitable calibre is that of 12 centimetres. The weight of the piece should be about 600 kilogrammes, and its metal steel. It should be

¹ It may be replied to this criticism that the formation of the "obus à mitraille" is the result of experience, and that theory never prevails against practice. The bursting charge only opens the shell, and the cone of dispersion remains dense, in spite of Major Leydhecker's statement.—*Ed., Revue Militaire.*

closed with a screw, the rifled part should be 10 calibres long, and should have 80 parallel grooves with a rise of 5° to 7° . The maximum charge of powder should be one kilogramme, and the range 4500 metres.

The weight of the carriage should not exceed 600 kilogrammes. Siege and garrison carriages cannot be utilized in the field because it is necessary to change rapidly from the travelling to the firing position, and *vice versâ*. A wheeled carriage is therefore necessary. Among possible expedients the Russian carriage of General Englehardt, and the Swiss carriage of the 12-centimetre field mortar may be mentioned.

The wheels of the Russian carriage are not taken off during the firing. In order to avoid their rapid destruction, a buffer is employed. The axle-tree is strengthened in the middle and attached to the eye of the buffer which is moveable. On the march the buffer is taken up, during firing it is let down again. At first it is not placed directly under the axletree for it terminates in a piece of gutta-percha which makes its total length greater than the height of the axletree from the ground. At the first shot, the recoil places it in its proper position.

It is stated in Russia, that in the experimental firing carried out on a stone platform, the latter was broken at the sixth shot, whilst a nut placed under the wheel of the carriage was not even crushed.

In Switzerland they have adopted, for the 12-centimetre mortar, an ordinary field carriage, whose wheels during firing do not rest upon the ground. With this object the axletree carries on the outside two little rollers. When the shot is fired these move upon a special platform. This is formed of three horizontal and joined timbers placed parallel to the axletree, which support two cross-pieces or beams placed perpendicularly to the axletree, and upon which the rollers slide. When the mortar is brought into action, the platform is placed under it between the wheels of the gun carriage under which the earth has been dug so that they do not rest upon the ground. When the mortar is fired, it recoils upon the rollers, until the wheels of the carriage, which only serve as checks, strike against the back wall of their groove. The mortar returns of its own accord to its original position. It takes five minutes to bring it into action.

The Russian method is more simple because it does not require any special platform. The Swiss method, when the direction of fire changes, requires a new arrangement, which necessitates a loss of time. As for the limber, one with seats should be preferred, which allows of part of the gunners being carried. The gun carriage will have two axle-tree seats and two boxes of case. The wagons will be those of field artillery drawn by six horses. They will carry 33 projectiles, 12 in the limber, 21 in the wagon body. The common shell will be to the shrapnel in the proportion of one to two.

The number of guns in a battery should be determined by the principle that the first gun should be loaded and laid at the moment when the last gun is fired. This is indeed the reason that six guns are allotted to field batteries. The same number may be retained here, for if the service of the short 12-centimetre gun requires more time, the time of flight of the projectile will be longer, which will make up for it. Allowing for 150 shots per gun, the battery will be composed of 6 guns, 12 wagons, 2 heavy carriages, and 1 field forge. Each group of four batteries will have two ammunition columns, each composed of two spare carriages, 25 wagons, two heavy carriages, and one field forge.

One battery for each army corps ought to suffice for all the requirements of war. These batteries will be attached to armies and placed under the direct orders of the general commanding the army. In fact they will only be made use of against strongly entrenched positions, in a battle where all the disposable forces will be engaged. Fire with reduced charges will suffice for ordinary cases. Each army (the author calculates for four) will then be provided with a group of four batteries of the short 12-centimetre gun.

It would be a good thing to form these batteries in time of peace, but the artillery has other and more urgent requirements. It requires before all, the number of horses necessary to horse six guns per battery; and next, the division of the brigade into three regiments instead of two, in accordance with the war service. If batteries of position were created, there is reason to fear that the necessities of the budget would carry with them sad reductions in the field artillery. This cannot be thought of. On the other hand field artillery has to deal with so many new formations at the time of mobilization, that it seems difficult to impose new ones on it. The best way then would be to attach the 12-centimetre short gun batteries to the foot artillery, taking care to select some officers belonging to field artillery or to the train, in order that the teams may not be intrusted to inexperienced hands. A half company of field artillery, say 80 gunners, will suffice for this service.

The above is an outline of the work published by Major Leydhecker; everything in it seems logical and carefully weighed. But will its ideas coincide with those of the future? Is there not a more simple means of reaching a defender concealed behind his parapets than either firing reduced charges, which involves loss of precision, or introducing a new calibre into field artillery, which would involve loss of the simplicity so sought after now-a-days? Is it certain that parapets will resist ordinary projectiles charged with breaking powder? It is a point which experiments have not yet decided; and therefore we only allude to it, but it is hardly doubtful that researches will be made in that direction.

When, two years ago, breaking powder first made its appearance in siege parks, permanent fortification was so completely revolutionized that we do not see the end of it. From that time the confidence which had been felt in the old fortifications was shaken, and questions of trace, which used to be burning ones, have ceased to be discussed. Masonry has lost almost all credit, iron still lasts, but no one knows for how long.

Will field fortification always remain the same? Is it not more restricted in its resources than permanent fortification and consequently more exposed to the effects of new weapons? It may be, then, that the progress in the attack, the necessity of which has been shown by Major Leydhecker, can be realized by a better organization of the projectiles in use. This would be the simplest solution.

BERKELEY,

July 12th, 1888.

that is needful. Such dexterity as goes beyond this is only of value as an incitement, an example, which may rouse less well-endowed men and awaken their desire of honour, and by no means with the object of exhibiting magnificent gymnastic performances before the enemy.

But of what use are gymnastics in war? Why should the soldier learn the bayonet exercise when the fire of rifles is decisive? Such questions appear on paper to be reasonable. Yes; even a practical infantry officer of high rank, whose authority no one who knew him would dispute, said to me once, as he watched the men exercising with bayonets and padded jackets; "That is all modern rubbish, in which so much time is spent, that at last the men do not know how to load their rifles in action." He was right. For if the men had not sufficient time to learn how to use their arms properly, because they did so much gymnastics, it would be better to do none and not even to learn how to fight with the bayonet. What sportsman has not in the excitement of shooting made a mistake of some kind, by forgetting to cock his gun or to withdraw the safety-bolt, &c., owing to which the hare has escaped. It is only when he has had such practice in shooting, that he carries out mechanically all the needful manipulation without thinking of it, that he can be sure of making no such mistakes. Just so the infantry soldier must be so practised with his arm, that he makes all the necessary motions correctly, by instinct and mechanically, even when his nerves are disturbed by the heat of battle, personal danger, &c. If the practice of gymnastics prevented sufficient time being given to such things, they would be an evil. When I noticed the number of miss-fires on the part of the enemy on the field of battle, when I found muzzle-loading rifles loaded with 10 successive cartridges, of which the first was put in hind before (a proof that the soldier had not noticed that the first shot had missed fire, and had therefore kept on putting in fresh cartridges one over the other), then I saw how right the above-mentioned infantry officer was, when he said that the firing-exercise should be so well practised that the soldier, even in battle, could make no mistake.

We know also that Napoleon I., who of all great captains had the greatest experience of war, laid down as a principle: "The fire-arm is everything, the rest nothing." The value of this maxim must increase with the improvement of the fire-arm. But we do not teach gymnastics in order to show our jumping or activity before the enemy, but in order to strengthen the power of the muscles of the men. With strength grows self-confidence, with self-confidence courage. He who is skilled, knows it; he who knows it, presses on. We do not teach the bayonet exercise in order that the infantry may rush in on arms of precision with the bayonet alone, as the Austrians did in 1864 with great loss, and in 1866 to their ruin, but we wish to teach it in order that the soldier may not fear a fight with the bayonet, may feel himself secure so long as he has his bayonet on his rifle, and may hold the certainty of victory in his hand. Goltz, in his work "The People in Arms," has brought forward the moral superiority of the offensive in such an overwhelming manner, that nothing can be added to what he has said. But the moral effect that is produced by the offensive on a large scale, is in small actions the result of a determination to attack with the bayonet. He who determines so to attack gains half the victory, since the enemy seldom waits to receive the assault. But he who has not made up his mind to come at last to the bayonet can never win, for he can have no

serious intention to assault. He who does not know how to use his bayonet will certainly not be determined to finally attack with it, and thus he will never make a serious attack.

However true Napoleon's maxim may be, and though bayonet fights are rare, yet there were some in the last war. Is a man in this case to use his rifle as a club? Ought he to be exposed to the chance of being unarmed as soon as he has knocked over one enemy, for certainly as a rule the stock will break if he clubs his rifle. After the storming of the forts at Düppel many rifles were found to be without stocks. When Prince Frederic Charles asked a soldier why he used his butt instead of his bayonet, the man answered; "I don't know; when you get your dander up the thing turns round in your hand of itself." This means that, if the man is more accustomed to strike than to point, he will use his rifle as a club, as soon as excitement overcomes him and nature gets the upper hand. Therefore it is necessary to make the soldier so accustomed to the bayonet by constant practice in pointing with that weapon, that it becomes natural to him to point, and that he will point, when he is excited, instead of hammering.

When I received my elementary instruction in military knowledge I was taught, that a Frenchman could by nature beat a German in a bayonet fight. Involuntarily I formed the idea, that in that case the German would be wise to avoid fighting with the bayonet against a Frenchman. Some very sound old officers went so far as to lay down, when arms of precision were introduced, the principle that it was right, when threatened with a bayonet charge, to retire firing from one position to another. Now that I have seen a few battles and many engagements, I know, that from such action no other effect can be expected than the loss of the battle.

The principle which was laid down by the most trusted Austrian infantry tacticians, that the only antidote to arms of precision was the bayonet, cost the brave Austrian infantry much blood in 1864, and became quite untenable in 1866. He who should endeavour, without firing a shot, to cross the whole of the zone which in these days is swept by infantry fire, would certainly be a corpse before he reached the enemy's line. But he who on the other hand does not make up his mind at the beginning of an action to go in at the close of the fire-fight, if the enemy will not give way, until he can see the whites of the eyes of the foe, has no intention of making a real attack and will not be victorious. Yes; make the intention to charge home apparent, or it will be better not to go into action at all. That sort of thing would remind one of those beautiful strategical manoeuvres which concealed the appearance of any intention to give battle, and therefore failed dismally.

I think that I have said enough concerning the necessity of the bayonet-exercises for infantry. I do not want every soldier to become a skilled fighter with the bayonet (that we shall never get), but each man should be able with ease to give a good strong point, when a point is needed, and should have obtained confidence that when he does so he will hit his enemy and kill him. The spiritless "clip-clap" which we sometimes hear for half-an-hour together by the word of command of some stupid N.C. officers is sheer waste of time, and is very like that stage-fight, of which an old experienced N.C. officer said to his pupils; "I give you my word of honour, you wouldn't pierce a sheet of wet blotting paper."

The other practical exercises in gymnastics (the practices with apparatus), are only of use to give a man confidence in himself. Even though infantry have learnt to jump over wide ditches or to climb walls, yet this will certainly not decide the victory, since it is quite a different thing to jump ditches and climb walls in drill-order and in the barrack square, and to do so after a forced march or a trying bivouac, with a pack on their backs. Moreover troops which are massed to give the decisive blow will not find such obstacles all along their front. But the soldier who knows well that he can overcome all obstacles advances with quite a different feeling of resolution to him whose inward voice cries painfully to him; "Can I get over that ditch, or that hedge, &c." Besides he who is practised in systematic gymnastics will jump even the smallest ditch with greater ease than he who has not learnt to jump, and who runs a constant risk of spraining his ankle or straining a sinew. This difference in efficiency becomes more noticable when the men are tired or are carrying their packs.

At the storming of Le Bourget, on the 30th of October, 1870, during the fight at the church, our grenadiers pressed in through the windows, and jumped twice the height of a man down into the nave. Troops who had not learnt to jump could not do this, even if there were no enemy in the church.

The individual instruction of recruits is in general so capitally carried out in our infantry that, if I go on to speak of everything, you will say to me; "But what you write about is what I see every day; why then should I read it?" while if you were not an infantryman all these details would bore you to read. I will not therefore enter into every part of this most important portion of our training, but will only speak of some few points, which to judge by my observation are worth mentioning.

With the infantry of the Guard I often saw whole companies with their recruits go out in the winter to practise field exercises, and this only a few weeks after the recruits had joined and long before they had been inspected and been sent to do duty with their companies. In the division which I then commanded I found this practice more rare. When I had discovered the object of it, I encouraged the infantry which were under my command to do the same, and the results showed me the advantage of it.

The man who, during the quarter of a year that he remains a recruit, sees nothing but the barrack square and his barrack room, and is employed only in the most mechanical and elementary exercises, may easily get into a stolid state of mind and make no farther progress. But if he has an opportunity, once in the week, either in the morning or in the afternoon, to go out into the open to learn his field exercise, he recovers from the monotony of his elementary training, and gets an approximate idea of his work as a soldier with a fresh desire to fit himself for it. Such excursions into the open country have as refreshing an effect as have the trips which a master makes with his scholars, when he takes the boys out of the close air of the schoolroom, and teaches them practical botany. Recruits can be taken out to these field exercises in winter as soon as they have been from a fortnight to three weeks with the colours. They may at first march in rear without arms, and may during the exercises stand in close order to mark the position of the supports, while the older soldiers act as skirmishers, patrols, &c. The instructors can then point out to their notice, almost

as if it were a game, all the different items of the field exercise, which taught in theory in their hours of instruction would take a disproportionate time, since that which he can see has far more interest for any recruit than that which he has to imagine.

You will perhaps say that the time now available for the instruction of recruits is already very short, and that it is impossible to take whole mornings and afternoons from the elementary exercises. So I thought at first. But when I inspected the recruits I asked for the daily return of drills, and found that the recruits of the very companies, who had made most use of this practice, marched the best at the inspection and showed an excellent discipline at drill. This was because they were not made stupid by doing only recruits drill. Besides without the recruits no company can carry out such practices in the winter, since the guard and fatigue duties of the garrison, in addition to the necessary musketry instruction, take too many of the men belonging to the batches of earlier years, the recruits not being yet available for garrison duty. For these reasons a captain cannot get hold of the older men more than once a week for the purpose of practising the field exercise.

But this is enough ; and what a capital time of year it is for these exercises ! The snow and the frost enable us to go everywhere, and the occupant of the land cannot claim any damages. It is obvious how superior to a company ordinarily trained will be one which has practised its field exercise ten or twelve times in the winter, at its full strength, during the recruits quarter of the year.

Another point, which I consider of great importance, is this ; our men have to learn and remember too many numbers, so many indeed that simple and untrained heads cannot do it. Only think of the regulations of the school of musketry with regard to the height of the sight at different distances. I think we might simplify this. I do not dispute the truth of what the school of musketry lays down, but it is too much for an uneducated man to remember. I think that it would be sufficient if he knew that when firing at cavalry at 400 metres and under, he is only to use the 400 metre sight, and is always to aim at the feet of the horses ; and that when firing at targets representing men at ranges under 400 metres, he is to use only the small leaf and should aim at their feet. Then the soldier has to think only of the 400 metre sight and the small leaf. He must be taught to follow the command of his officer (section-leader), at ranges above 400 metres. If however he has to do with a target representing the bust or the head of a man at short ranges (the only ones at which they ought to be used), I think that, rather than burden his memory with a mass of figures, it would be better, considering how much practice at targets our men have, to teach him to judge instinctively how much below the target he should aim, according as, in proportion to the range, it is more or less distinctly visible.

On other points also their instruction burdens the memory of the soldiers very much ; I think too much. I believe that if the instruction were more applied and practical this might be diminished. We have it is true excellent directions for instruction, but I have never yet seen a handbook, which confined itself solely to what the private soldier ought to know ; this should be divided into what the recruit has to study, and what the older soldier must be taught. I do not think that you could do a greater service to the infantry than by preparing such a handbook. It would be a long and tiring task, for you must employ an immense time in trying to make it very short.

4th Letter.

FIGHTING IN EXTENDED ORDER AND THE NEW REGULATIONS.

IN the further training of our infantry, in the marching drill of single men as well as in the instruction of squads and in the manual and firing exercises, we find the same care given to the training of each man as an individual as in the first elementary drill of the recruit. An infantry officer, who has done his duty thus from the beginning and has paid attention to nothing else, does not recognize the excellence of this system and its logical development so well as an officer of another arm, who, as I was myself, has been accustomed to see the foot drills carried out in masses, and is astonished to see how quickly these drills can be learnt, when they have been preceded by a careful training of the individual soldier. When a man can march well, that is to say naturally, freely, in an unconstrained manner and firmly holding himself upright, proudly and with self-confidence, when the small squads marching at three paces interval can move straight to their front and wheel well, then the drill of the complete company is a mere trifle and can be easily taught.

How rich in results is the training of the individual soldier! This is one answer (I say one of many), to the question which I asked in my first letter, as to whence were derived the excellence and the superiority of our infantry. An important part must be attributed to the instruction of the soldier in fighting in open order and to his habit even in this of obeying the orders of his officer. Wherever this training of our soldiers has been properly made use of, there our infantry have obtained great success with comparatively small loss; but where the officers have attached little value to fighting in open order, they have suffered loss to such a degree, that success has often been doubtful and failure might even have occurred, if it had not quickly been brought into use.

I have already in my first letter referred to an action which furnishes a proof how much smaller were the losses of regiments which attacked in swarms, than of those which advanced in company-columns. Allow me to mention here yet one other episode of battle, which I saw at Sedan.

We were standing in position to the East of Givonne, fronting to the West, with the village of Givonne, which was occupied by the rifles and fusiliers of the Guard, lying in the deep valley of the Givonne to our front. It was about 1 p.m. The enemy's infantry had drawn back from the opposite edge of the valley of the Givonne as far as the Bois de la Garenne, which stood on higher ground. A few companies of our infantry had made use of this opportunity to occupy the farther edge of the valley. One company of the rifles of the Guard had done so from Givonne in front of my line of artillery, while in front of the left wing of that line two companies of the "Franz" regiment, under captain von C., advancing from Haybes, had taken up a similar position. The last two companies had crowned the farther edge of the valley, and had got

under cover in a single thin line of skirmishers. The enemy's artillery fire was as good as silenced.

Suddenly to the South of the Bois de la Garenne a thick mass of the enemy's infantry rushed out of a hollow which runs from the wood to the Fond de Givonne, and charged as hard as they could run on Haybes, and therefore directly on these two companies. I judged these masses of infantry to amount to 5000 to 6000 men, and think now that that must have been about the right number, since, according to the French account, this must have been the left wing of Wimpffen's despairing attempt to break out (Grandchamp's division). The enemy's masses of infantry, running up in deep columns, fired incessantly as they ran with their rifles held horizontally at the hip, and thus covered themselves with a cloud of smoke. You could distinctly see with a field-glass how the men loaded and fired as they ran, without raising their rifles to the "present." To the naked eye the mass looked like a gigantic advancing heap, blue above (the tunics) gray in the middle (the smoke), under which the red trousers and the struggling legs showed with a sort of trembling movement. Though I gave the order as quickly as possible to all the batteries of my line of artillery (90 guns), to open a rapid fire on the enemy's masses of attack, I could not help feeling very anxious about the two companies of the "Franz" regiment which lay on the other side of the valley of the Givonne, for if the enemy's masses succeeded in getting to within 200 paces of them, I should not be able to fire any longer with my guns at the head of the attack, on account of the danger of hitting our own infantry.

I had reason indeed to be nervous. Though the shells, striking and bursting in the midst of the thick masses of men, wrought horrible destruction, and threw them into confused heaps in which smoke and dust were mingled with the colours of the uniforms, while above them men's bodies and limbs were hurled up into the air by the explosions, the mass still came on nearer and nearer, for the enemy fought with the courage of despair. The moment soon came when I was compelled to order the fire on the head of the column to cease. This head broke loose from the mass, and charged in on the companies.

In contrast to the thick smoke which was made by the rapid fire of the French, no fire could be seen to proceed from our companies. I turned my field-glass on them and then at last saw here and there the puff of a discharged rifle; the whole line of skirmishers lay flat on the ground, their rifles at their shoulders and their sights on their target. Captain von C. only, walking up and down as gracefully as we often see him at a ball, moved along his line of skirmishers, and (as he told me afterwards), exhorted his men to aim quietly and shoot slowly. But each bullet struck down one of the advancing enemy; the number of those who drew near to the skirmishing line grew less and less; a few even reached the line, and there met with their fate at the muzzles of the rifles, for two of our men lie there bayoneted through the back from above. But the whole attack, which was commenced with such boldness, died away. Only a few survivors turned to fly, and were shot down by the pursuing fire of the infantry. The whole mass was destroyed in the space of ten minutes! On the other hand the entire "Kaiser-Franz" regiment lost during the whole of the battle of Sedan only 2 officers and 80 men. Of this loss only a very small proportion was incurred by these two companies during the short episode which I have related. So great is the superiority of the well-aimed, well-directed,

and good individual fire of troops, who have been well trained in detail, over shock tactics in mass-formation ! It is not the offensive, as such, which has lost all use and value owing to the system of instruction and the perfection of fire-arms, but such shock tactics in mass-formation !

This was already made evident in the war of 1866 by the destruction of the brave Austrian columns of attack. But the greater part of the success of the Prussian infantry was to be ascribed to the superiority of the breech-loader rather than to the fighting formation, since our infantry also frequently used closed formations in this war. But in the example from the battle of Sedan which has been quoted, a mass-formation was employed by that force which possessed far the better infantry arm ; and yet it could not stand against the inferior weapon, even though the proportion of numbers was 6000 to 300 ! Granted that the 300 were supported by an effective fire of artillery, and that this destroyed half of the column of attack, yet the odds will be still 3000 to 300, or 10 to 1. This superiority of individual fire on the defensive over mass-formations in the offensive must have increased since the infantry weapon has been yet more improved.

It is easy to understand how hard it is for infantry officers who have grown old and gray in the service to give up their dear old fighting formations. But such formations as those of Frederic the Great, who personally led on to the storm his battalions deployed in close order with bands playing and colours flying, halting only at 100 paces from the enemy to fire a volley, are no longer possible in these days of Gras and Mauser rifles. The movement also, by which a brigade of 6 battalions, while the first line of 3 battalions fired volleys in line, sent forward its second line in columns of attack through the intervals in order that they might charge in with the bayonet, is no longer suitable to the present day. New inventions entail changes, and the old movements which we have loved pass away like dreams. We must make up our minds to this. The much-loved modes of fighting of the knights of the middle ages had at last to be given up, and no Arnold von Winkelried can now decide a battle by gathering the enemy's spears against his own breast, and thus making a breach in the armoured ranks of the foe.

So also we must acknowledge that the charm of a well-dressed advancing column of attack (battalion-column on the centre companies), as it moved in step to the tap of the drums, is gone for ever, since it must lead to the destruction of the assailants. Even the term "column of attack" has been changed in the last regulations into "column on the centre ;" a proof how entirely we have renounced any idea of using the old column of attack within the zone of fire. Even the use of the smaller company-column has been to some extent given up within the zone of very effective fire. In nine cases out of ten it will serve only to feed the fighting lines of skirmishers, and it will but rarely happen that a closed formed company-column will be brought up into the front fighting line to work out the decisive struggle. Seldom indeed ; but its effect will then certainly *be decisive*. Thus it may be used by night, when the darkness will diminish the effect of arms of precision, or if smoke or their own loss has physically or morally blinded the eyes of the defenders, or if the ground affords cover to the advance of company-columns which may take the enemy by surprise. But the essential point of infantry action will always be the individual action in the fire-fight, and that infantry will gain a decisive superiority which has under-

stood how to train each individual man so that he can make the best possible use of his rifle, and has thus learnt to follow the signs, the orders, and the example of his leaders. For of what use is an effective fire, if it is not carefully directed on the most important point? The real difficulty of the training lies in teaching the men to steadily follow the directions of their leader, in spite of the (so-called) loose order, and and to preserve discipline. This combination of discipline with individual action was the cause of the superiority of the German infantry in 1870-71, and will make any infantry superior to that of the enemy, if the latter has not attained to the same standard.

This is well known among us even in the highest ranks, and all the changes which have been made in the regulations, as shown by the infantry regulations of the 1st of March, 1876, point to this end. We not only see, as I have said above, the old "column of attack" done away with altogether, and its place taken by the "column on the centre," to be used only as a rendezvous-formation outside of the zone of the enemy's fire. The formation in two ranks (company-columns) is in the 14th chapter expressly laid down as the regular fighting formation, while the greater part of the regulations deal with the application of "fighting in open order."

The changes which have been made show that the highest authorities of our army have used the experience of a victorious war to carry out improvements, and have thus acknowledged that some deficiencies did exist. We need not be ashamed to own this; we should rather glory in it. Indeed, if we look closely into the phases of our battles, we shall acknowledge that our infantry, especially when they met the enemy for the first time, were exposed to his fire in columns which were at once too strong and too deep, and that this was the principal cause of the heavy losses in the earlier battles. I might for instance, as an eye-witness, make mention of the Guard corps, though I saw it only from a distance, since during the battle of 18th of August (Gravelotte) I stood in the centre of the line of artillery, and thus at a considerable interval from the main infantry fight.

However I need not enter at any length into the details of the attack of the infantry of the Guard on St. Privat, since you will already have read and heard enough about it, and since you know that the losses of this infantry in front of St. Privat have been the principal cause of the many propositions and experiments as to how, given that a force acting on the offensive must cross open ground, it may best avoid such colossal losses by means of some other tactical formation.

You can form some idea of the terrible effect of the fire, when I tell you that a flock of frightened sheep, which burst out from Ste. Marie and galloped across the front of the Prussian infantry, and which were perhaps in the dust which they raised mistaken by the enemy for cavalry, were killed down to the last sheep. They afforded a most welcome meal at the bivouac of the Guard corps on the following day. There are situations in battle in which the hearts of men are so affected by the sense of danger, that there is an end of all manœuvring; they can move neither to the right or the left, and can only advance or retire. After they had once unexpectedly come under this fire of the enemy, which they had undervalued beforehand, only a forward movement was to be thought of, and the officers, recognising this, shouted nothing but; "Forwards! Get on!" Thus it came about that shock-tactics, which four years before had failed before our fire, had now

apparently to be used by us. But fighting in extended order soon developed itself out of the combat in masses, since the fearful gaps which were caused by the enemy's bullets destroyed at once the cohesion of all closed bodies, and broke them up into swarms, which—Honour to the Heroes!—continued to advance, until they arrived so close to the hostile position that they were able to answer the fire of the foe. At this point they received the order to lie down and to take cover (which was very imperfect) in the folds of the ground and in the furrows, to beat down the enemy's fire with bullets, and thus, with the assistance of the batteries which had pressed forward with them, to prepare the way for the storm by a long fire-fight, for the assault could not be fully carried out until the left wing of the XII. corps was in a position to assist by a flank attack.

I have not watched the fighting of the infantry of other bodies of troops with sufficient closeness to enable me to form a settled opinion with regard to it, but the proportions of the losses in the earlier and the later battles give such strong evidence on this matter, that I am inclined to believe that the details must in general have been much the same.

The brilliant author of the work "The People in Arms" comes, it is true, to another conclusion. He cites amongst others the instance that the whole of Werder's army, in the three days' fight on the Lisaine, lost only as many men as a single regiment of infantry in the battle of Vionville-Mars la Tour. From this he concludes that the longer the duration of a war the more does the energy with which it is conducted fall off. I must own that, so long as the war lasted, I noticed no falling off in the eagerness of our troops to push on. Quite the contrary. When General von Budritzky, on receiving the order to storm Le Bourget, on the evening of the 29th of October, sent in answer the following message to the general in command; "The first shot shall be fired at 8 a.m.; at 9 a.m. punctually I shall be in Le Bourget;" his infantry did not fail him. They pushed on with such impetuosity that punctually at 9 o'clock he was able to step over the barricade at the Northern entrance. But the leaders had become more careful in the employment of fighting formations, after they had recognised that those which had been used up to that time, and which were laid down in the regulations, were not all suitable for every emergency. It is certainly not desirable, as a rule, to depart from the prescriptions of the regulations, but when one sees that the conditions are different from those upon which the regulations were founded, it then becomes necessary to do the best for oneself that one possibly can. But, if the needful changes have not been made in good time, that is to say in peace, this knowledge will be bought at a terrible price. The changes in the regulations which were made after the war fully recognised this necessity.

These changes in the regulations, which are laid down in the new edition of the 1st of March, 1876, have certainly not satisfied all who have thought over the need for such modifications. It was scarcely possible that they should do so, since opinions differ so widely, while the propositions made were so many and so clever, that some of them may be considered as more brilliant than practical. But the new regulations were founded upon the whole progress of long-range weapons. The elasticity of the regulations, the freedom which is permitted to everyone as to the formation to use in any particular case,

the margin which is allowed with regard to the intervals between closed bodies of troops and the firing-line, and above all the formal order that the instructions contained in them are alone to be observed (which forbids the narrowing directions of other authorities), renders it possible for leaders in war to select always that which is right, and to adapt their movements to the ground and to the dispositions of the enemy.

5th Letter.

ARE ANY MORE CHANGES IN THE REGULATIONS DESIRABLE?

YOU are quite mistaken, if you gather from the close of my last letter, in which I stated that the new regulations are founded upon all the improvements of the new weapons, that I desire no modifications in them; as you will like to hear what changes I do wish for, I will tell you at once.

In the first place the editing of the regulations is such that it is very difficult to find your way about in them. The matter might be far better arranged. It appears to me as if the members of the committee, which edited these regulations of the 1st of March, 1876, had not always been unanimous, and as if they had made compromises with each other. I am confirmed in this opinion by the fact that the regulations of 1876 are not stated to be altogether new, but are styled "A new edition of the regulations of the 25th of February, 1847, taking into account all modifications which have been made up to the 1st of March, 1876;" thus the old plan has been retained, while the various changes have been inserted in their proper places. The consequence of this is, that, before one can get a clear idea as to the real intentions of the regulations with regard to the most decisive and important instructions for battle, these have to be collected from various parts, under the heading of the company, the battalion and the brigade, and have to be then compared with each other. This considerably increases the difficulty of the study of the regulations. It is certainly a matter for argument, whether this is altogether a misfortune, since an officer is thus compelled to work up the regulations carefully if he proposes to master their spirit; while since, thank God, it is the case that the regulations with all their changes and modifications are the outcome of the experience of the last century, and not the mere fancy of any particular moment, it is fortunate if officers are compelled to really study them hard. But since one has to search for instructions which are laid down in different parts of the book, one remains doubtful about many matters, and this is undesirable, for regulations ought to leave no room for doubt. They ought to be accepted as the statement of military dogma, which is not open to criticism.

I will, for example, show you one doubtful point by asking you; "Do the regulations permit that a deployed battalion, which is advancing in line to the attack, with drums beating, shall halt to load, with the object of firing volleys?"

Para. 49 contains the directions for the advance in line with drums beating. But this para. is part of the 10th chapter which, together with the 11th, 12th, and 13th chapters, deals only with the formation in three ranks. The formation for battle is not considered until the 14th chapter, and this formation is expressly stated to be in two ranks. But since in the 14th, 15th, and 16th chapters, which refer entirely to the fighting

formation, there is no mention of the advance with drums beating, one is driven to believe that by the regulations the advance of a deployed battalion in line is limited to the formation in three ranks, and that this movement is to be used only as a test of good drill, and that on the other hand the advance of a battalion in line for the purpose of firing volleys is a movement which, owing to the improvement of the infantry weapon, cannot possibly occur and ought not to be attempted in battle, that is to say within reach of the enemy's effective fire. After having arrived at this opinion, we come upon para. 88, which contradicts it at its very beginning with the words; "the charge with the bayonet will be carried out by a battalion advancing in line, &c., &c.;" though in all that has gone before there has been no mention of a battalion advancing in line from the fighting formation. According to these words the regulations do not declare it impossible that a battalion may advance in line in battle. But nothing is laid down as to "how" this advance is to be made when the formation is in two ranks, or as to whether the drums are to follow in rear, or the colours to lead the way.

Allow me to allude to another doubtful point; "May the word of command; 'Halt, to load!' be given to a battalion advancing in line?" This word of command is mentioned only in para. 43, as applicable to a closed detachment which pushes forward into the firing line as a support to the skirmishers of a company. One would think that when a battalion advances in line with the object of opening fire, it would rather be a question of not losing a second before answering the formidable fire which will meet it. But there is nothing laid down in the regulations on this point, and one is left in doubt as to whether this evolution is generally permissible.

I must honestly own that I have never troubled my head much about this doubt, for I am entirely convinced that the advance of a battalion in line within the zone of fire, as also the word of command to the whole battalion; "Halt, to load!" can never take place in war, and that if an officer commanding a battalion should attempt it, he would find it impossible to carry out. But the more such an officer is convinced of the sacred inviolability of the regulations, the more will he, when drilling his battalion, be troubled by this doubt, since he cannot tell whether he ought, must, or should practice such a movement. If he practices it and his superior officer does not approve it, he will be told that he has not followed the regulations at the least; if alone and the superior officer asks to see it, his battalion will be told to be insufficiently drilled. Such a doubt as this is therefore, any way, it destroys all confidence in the regulations; for this reason it ought to be drawn up more clearly.

Another wish, which I cannot refrain from expressing, is but more important. When I consider that the formation in which our infantry will in future generally fight at the most decisive moments is a line of skirmishers, it is in my opinion of no importance whatever whether the closed formation, in which the supports and the columns move, is in two or in three ranks. I therefore think that we might return to one single formation for all closed bodies of infantry. We have now two formations. That in three ranks is the normal formation; the regulations themselves call that in two ranks the "fighting formation." Is it not an anomaly that our normal formation should not be applicable to battle? During the whole of the last war no one ever saw infantry move in any other formation than that in two ranks, and the first

occasion on which I again saw the infantry in three ranks was at the parade at Longchamp, after the conclusion of the preliminaries of peace. How much more simple and intelligible would the regulations be, if we had only one kind of formation !

This system of two formations springs from the time when we used only the men of the third rank as skirmishers. But since the introduction of the breech-loader every man is instructed with equal care in this duty, and as fire-arms have been so improved that decisive struggles can be fought out in open order only, while closed masses can only exceptionally be moved within the reach of the enemy's fire, there is now no reason why the fighting formation should differ in any way from the normal one.

I desire therefore above all that the regulations shall lay down only one kind of formation, either that in two ranks or that in three.

I have found that this two-fold formation leads to many inconveniences. It is of no little importance for battle that the division of the company into sections, half-sections, and squads shall be permanent. But if a company falls in in three ranks, and then changes into two, owing to the firing section being found by the third rank, the entire hierarchy of the system of command is broken up. If, on the other hand, the division into squads is based on the formation in two ranks, then the normal formation in three ranks is a mere chimæra, or at any rate it ceases to be the normal formation. During the war one naturally divided the company into squads, &c., according to the formation in two ranks, since one always marched, stood and fought in that formation.

But even in peace this two-fold formation has the disadvantage, that it uselessly entails the expenditure of a great deal of time, which is thus lost for instruction. In the first place it takes a long while to make clear to the recruits the elementary fact, that he belongs now to this and now to that section, and that he has to pay attention to and obey now this and now that N.C. officer or officer. Moreover not a few drill-instructors take an especial pride in taking up formations and in performing evolutions with the skirmishing-sections out, and in then forming them into the third rank again, and all this without losing step. The regulations certainly forbid that this change from one formation to the other shall in any battalion be made the subject of an inspection. But the men of "the good old school," and those zealous persons who take them as a pattern, practice it enthusiastically at company drill with every possible complication. You may hear the words of command given in the following order ; "Column on the right !" then "Quick march !" then "Form company column !" "By sections wheel !" "Form the third rank !" "Right-about turn !" "Form company-column !" "Quick March !" "Left turn !" and then again "Form the third rank !" and all sorts of similar ingenious fancies, which are found only on the drill-ground, being the product of a heated brain, which is itself the consequence of cold feet. When a drill-instructor of this kind did not succeed, by means of the most extraordinary combinations, in getting his men into a state of hopeless confusion, his face shone with the same delight as is felt by the victor in a pitched battle. When I saw this sort of thing, I could not help praising the zeal of the drill-instructor and the long suffering of the men, but neither could I help asking ; "What on earth is the use of it all ?" I was generally told that its object was to make the men smart. But some old drill-

instructors, who had carried out these manœuvres from their youth up, while they still retained the conviction that drill ought to be the means of training men for battle, have acknowledged that a change of formation made in step had no effect whatever in making the men smart. They simply called it "a proof of drill," carried out in order to throw dust into peoples eyes, and confessed that it was liable to fail at once, if the specially drilled flank men of sections were changed (for example if the right-hand man of the company was sick;) they drilled for the pleasure of drilling. A great deal of time and trouble was thus wasted upon a practice which did not in the least improve the men. But this waste of time would no longer take place if we had only one kind of formation. A far better way to make the men smart at drill is by often drilling the company as is laid down in Para. 43 of the regulations, without keeping each man to his one special place in the ranks; unfortunately, you very seldom see this done.

You ask me for which formation, that in two or that in three ranks, I should decide if I had the choice? No, you do not ask anything of the kind. You take it as a matter of course that I prefer that in two ranks. But think a moment! You are quite wrong about me. In the first place I might say that it appears to me a matter of no importance whether masses are formed in two or three ranks. Thus said one of the highest authorities in our army, when I put this question to him; he meant to say, because infantry now fight only in extended order. But if I must give a decision on this point, I decide for the formation in three ranks. I think that even in skirmishing the file of three men, who are bound to hold together and support each other, is better than the file of two. For if the file consists of two men, as soon as one is wounded the other is left alone. There are further other considerations, which are all in favour of the formation in three ranks. A company formed in two ranks is too long when it is at war-strength, and this considerably increases the difficulty of command, if the captain or the sergeant-major has to give an order to the whole company. All the other columns (in sections, or in half-sections) seem to me more handy in the formation in three ranks, and they can also adapt themselves better to the ground; in any case they are not so deep, since the section interval is less; and the length of the column when marching by files is shorter.

I can think of no disadvantages which would result from this formation. If a closed support or a whole company found itself in a position to fire volleys, the formation in three ranks would not in any way diminish the effect of the volleys. Our regulations even recognize volley-firing in four ranks. On the contrary a body of troops formed in three ranks is more easily controlled than one in two ranks, and this is of importance when many volleys have to be fired, and the target and the sight have therefore to be changed.

But some drill-instructor may ask me, how are we to extend, when a battalion advances in line, without causing gaps in the line; for example, at the word "Extend!" when the leading half-sections of companies are thrown forward? With a full recognition of the evil which might result from this, I should lay down that a closed battalion which is advancing, whether in column or in line, should, at the word "Extend!" always throw out the two flank half-sections of the whole battalion, then the two next, and so on. It is true that the intervals between two neighbouring battalions advancing in line will be thus

greater than they now are ; but that in my opinion would matter little, considering the present range of the infantry weapon, especially if we take into account that we shall never again see several closed battalions marching in one line against an actual enemy ; this will only take place in the second or third line.

There are thus many things to be said in favour of the formation in three ranks ; I do not know one in favour of that in two. Yet stay ! You may perhaps say, the Square ! You must be joking ! I have studied the official accounts of 1866 and 1870-71 with care, and in all the six volumes have not found a single case mentioned in which Prussian infantry have formed square, with the exception of Des Barres battalion (the 1st battalion of the 11th Grenadier regiment) at Langensalza. All the other cavalry charges have been repulsed without forming square. I may therefore well be pardoned for not having thought of the Square.

Another suggestion which I should offer, if I ever sat on a committee on the regulations, would be the suppression of the "Shoulder arms !" The Austrian infantry prove to us that it is possible to come from the "Slope" to the "Present," while sentries might, as in Austria, salute by presenting instead of by shouldering arms. The march-past with shouldered arms should also be given up. If you wonder that I am an enemy of the system of shouldering arms, I will ask you to watch recruits at drill and convince yourself how much time and trouble it takes to teach the soldier this motion, and how much skill is needed, that, firstly, the butts shall not be too far to the front and thus spoil the whole appearance of the ranks, and, secondly, that the rifle shall not, owing to the butts being too far to the rear, overbalance from the shoulder and lean to the front. Now as to the march-past with shouldered arms ! Though with the greatest care and trouble the troops have been taught a good, free, natural and easy march, we shall find that, owing to the discomfort of carrying the arms at the shoulder, and owing to the balance which must be preserved in order that the right hand may hold the small of the butt and not the knob of the lock, the step will become shorter, more constrained, and more tiring ; this will be caused principally by the tendency of the men to lean backwards, in order that the rifles may rest against their shoulders. Marching with shouldered arms must therefore be practised hundreds and hundreds of times before it can become free and natural. What an immense amount of valuable time, which might be usefully employed, is lost in this ! Against the abolition of the "Shoulder" you may perhaps urge, that this motion exercises the muscles and thus tends to give a smart bearing to the men. I should certainly be the last to propose to give up any of the peculiar rigid bearing of our army, since that is the source of our admirable discipline and is also the outward expression of obedience. But I think that just as good a bearing might be obtained with the "Slope," and I believe that the saving of time in instruction, time which might then be used for tactical improvement, would be so great, that it would be worth while to train a battalion, once as an experiment, without the "Shoulder Arms !" while the others should be drilled as now. If the rigidity of movement of this battalion fell off, even in the smallest degree, I should be prepared to let my idea drop.

With the same object of saving time by abolishing such things as appear to me to be of no use, I should lay down that the manual exercise, wheels and dressing by the rear should be practised at company

drill only. The regulations already forbid closed columns to be used for drill or inspection by any body of troops larger than a company. If only this prohibition might be extended to the manual exercise, wheels and dressing by the rear! We now not only see the officer commanding a battalion assiduously practising the manual exercise and wheels with his own battalion (which indeed he must do, since it is so ordered in the regulations), but we even find brigadiers who have a taste for that sort of thing making all their six battalions do the manual exercise simultaneously in such a manner that the whole brigade shall move together. There is nothing about this in the regulations, and yet you may often see it done. The officers commanding regiments and battalions must fully rehearse this with their commands, in order that all may go smartly. I at one time thought that it was a proof of a narrow mind, when I found a brigadier practising this sort of thing, but I have seen some men do it who were well known to be intelligent; when I put to them my constant and very annoying question; "What is the use of it?" I received the answer that it was traditional and that every brigadier did it. A great deal of time is thus also cut to waste.

But in these days time is money; and this is true not only for English tradesmen, but also for the Prussian army. I think that we take up as much of our drill season by the manual exercise by the battalion, by the "Shoulder Arms!" and by our double formation in two and three ranks as, taking it altogether, would amount to six weeks in the year, or at least to six or eight weeks in the three years of service. How excellently we might employ this time in moving across country, during the winter when all the fields are covered with snow and we can therefore go where we like, or in working with companies in disorder,* or in practising marches, or in any other similar practical tactical exercises, for which we now lack time and opportunity.

I may finally be permitted to draw attention to a slight omission which I have noticed in the detailed instructions of the regulations. There is in fact no exact order with regard to the manner of unloading the rifle. A rifle is frequently fired during unloading. If the men then have their arms at the "order," the next man may very probably be hit, as soldiers often hold their arms slanting while unloading. If they unload in the ordinary loading position, the front ranks are in some danger. It is best, as I have proved with the division which was under my command, to unload at the "slope."

* NOTE.—The words used are "*unrangierter Kompagnie*." This means that the men have fallen in promiscuously, and not in their customary places. N.L.W.

6th Letter.

ON COMPANY EXERCISES.

YOU have completely misjudged me, since you have gathered from the desires which I have expressed with regard to some modification of the regulations, that I wish that the exactness and the precision of the drill should be somewhat relaxed. Quite the contrary ! When I said that I should wish that the manual exercise, wheels, &c., should be no longer practised by battalions, and that these units should not be inspected in them, I desired so much the more on this account that everything should be worked out and studied with even greater care during the training of the company. It is entirely because I am anxious that the details of the regulations should be more exactly carried out that I should like to see these regulations cut down to what is strictly necessary, so that they might be worked out and studied as exactly as possible by the very smallest units, and that thus the elementary portion of the exercises might reach its climax in the company, instead of as at present in the battalion. For the manner of fighting, which has become necessary owing to the improvements in fire-arms, allows us no longer to work or to deal with the battalion, of which the place is taken by the company, as we may learn from the plan of any battle and from the maps in the official account. The company has thus become the practical tactical unit, though for the sake of convenience we still reckon by battalions, for the reason that a company has too little fire power to last and melts away too quickly in battle. The careful training of the company should therefore be a matter of the greatest solicitude, since the drill of the battalion goes a little above elementary, and more or less enters upon the sphere of applied tactics.

For this reason I have always maintained that the drill of a company should occupy itself rather with the "how" than with the "what," whereas in the exercise of a battalion the opposite is the case. The officer commanding a company very rarely finds himself in war in a position to make great tactical, and still less strategical, evolutions. His objective, whether in the offensive or the defensive, is as a rule very clearly marked out for him. But the struggle, so far as he can influence it, is decided by *how* he carries out his work, by how his men take advantage of the ground, how they find cover, how they shoot and whether they hit, and how they obey his signals and orders with regard to advancing, lying down, aiming and the nature of fire. The more therefore that the centre of gravity of the struggle rests upon the independent action of individuals, the more do we need discipline, by which I mean that intelligent obedience which welds this independence of many individuals into a concentrated whole, and into a real power. Have we not all quite recently received a proof that all the inventions of modern times, breech-loaders, mitrailleuses and rifled guns are useless against that most primitive weapon, the spear, when no

discipline governs their action. I refer to the annihilation of Baker's troops at Suakim. For we cannot assert that an Egyptian is a coward by nature. The armies of Mehemet Ali and of Ibrahim have proved the contrary in the first half of this century.

I consider therefore that it is necessary, when dealing with a unit up to and including a company, to pay attention only to the correct execution of such things as are ordered. If the officer commanding the company reaches this standard, he will have sufficiently employed his capability of instructing and supervising. I cannot, on the other hand, think it right, that scientific tactical evolutions should be carried out at company drill. But we do see, and not rarely, fancy movements, which are quite unlike anything which could possibly happen in actual battle. For instance, you may see an exercise carried out which consists in sending one section against the front of the enemy, while the second attacks him on one, and the third on the other flank, until at last he is hemmed in, on the exact pattern of the battle of Sedan; but in practice we shall never find an enemy at once so indolent and so complaisant. False ideas are thus excited, springing directly from impossible representations of fighting during peace. As a man works his company during peace so will he try to work it, at any rate the first time, in war. If the result does not come up to his expectations it is practically a failure. For this reason a "Turk," as a complicated manœuvre has been nicknamed by some wag, should be banished from all company exercises, which are carried out only on the level drill-ground or barrack-square.

It is quite true that pressure on a flank has now ten-fold power. I have repeatedly seen this in war, not only on a large scale, as when at Königgrätz we of the II. army fell upon the flank of the Austrian line of battle, but also in the case of small bodies. For example, in the battle of St. Privat we were for hours engaged in a delaying action of artillery in front of the enemy's position, which crowned the heights between St. Privat and Amanvillers. The enemy had pushed forward some battalions extended as skirmishers down the slope to their front; the fire of these troops caused so much loss to my batteries, that the general commanding the corps sent me successively six companies as an escort; these were for the most part distributed by sections in the intervals between the batteries, in order to prevent the enemy's swarms from rushing in against our front, as our skirmishers had done at Königgrätz in the attack on the Austrian artillery line between Chlum and Nedelitz. But the French skirmishers remained at a distance of from 900 to 1000 paces, and continued to inflict loss upon us, while our needle-gun could not hit their scattered individuals. The brave infantry soldiers of the Augusta regiment wished over and over again to rush forward, in order to free us from our troublesome "vis-à-vis." But since I had been ordered to carry on a delaying fight for a time, and since the infantry who could advance were fewer in number than the enemy, and would have masked the batteries by their advance, so that the latter would have had to cease firing, I several times stopped this premature valour. Major von R. then suggested to me that a company might be pushed forward by a hollow in the ground upon the enemy's left flank. Since this movement did not mask my fire, I permitted it to be carried out. Hardly had this company (Captain von A.'s) opened fire from the prolongation of the enemy's line of skirmishers than the whole line rose and retired up the slope. Now at last we were able to

see how large were the numbers of the hostile infantry who, hidden in the furrows of the ground, had laid wait for us in such threatening propinquity. We reckoned them as being in all 9 battalions, which lay in three lines one behind the other. Our shells wrought great destruction among these masses, as they fled up the slope. Since, by great good luck, the general advance on St. Privat took place immediately after this episode my batteries now found the ground open in front of them, were able to advance at a rapid pace, and to reach the heights to the right of St. Privat. Thus the sudden flank fire of one single company had made 9 of the enemy's battalions fall back. The effect of such a flank fire is magical, especially owing to the idea, which seizes the enemy when they are surprised by it, that they are in serious danger.

But this effect can be produced only when either the direction of the advance leads directly against the enemy's flank, or when folds of the ground, to which the foe has paid no attention, give an opportunity for it. In very rare cases will the force, which can carry out such a flanking movement, be less than a company; while the company which does carry it out, will as far as it is itself concerned make a frontal attack. The highest aim for instruction which a company can select for itself will therefore be an exact regulation frontal attack; at the most it may add slight changes of front, the reinforcement of the fighting-line, the withdrawal of men from that line, good fire-discipline and the most accurate use of its rifles.

This, as I have said, will give the officer commanding a company enough to do, if during the drill-season he drives it thoroughly into his men. But this need not prevent any captain of a company, during the manoeuvres or in war, from skilfully taking advantage of the ground in order, when possible, to gain the enemy's flank, and from making a frontal attack with his excellently trained company upon the flank, rather than against the front of the foe.

Every infantry officer knows how hard it is to teach the men to handle their rifles correctly. It is not sufficient that the soldier should know what he is to do with his rifle; no, he must also make use of this knowledge instinctively, without having to think what he ought to do. I will only remind you of the need for careful attention to the bolting and unbolting of the safety apparatus. Just as the sportsman, before he fires, without thinking mechanically cocks his gun, so the infantry soldier must, before *he* fires, mechanically but correctly, slowly and without a jerk, unbolt the safety lock, and must again bolt his loaded rifle when the fire has ceased. He must be one with his rifle, and must know whether it is loaded or not without being obliged to look to see. He must mechanically, and without having to think, come correctly to the "present," and he must be quite unable to pull the trigger in any other way than slowly and without a jerk.

It is unfortunately a common fault of drill-instructors, when teaching the handling of arms, to attach greater importance to the working together, and to the resounding slap on the butt (to which every sergeant would like to join an "Eyes left!"), than to the skilful use of the rifle in accordance with the regulations. Even under the very best drill-instructors it is a long time before the correct handling of his arms becomes second nature to a soldier. He must practice it hundreds and thousands of times. But it *must* become second nature to him, for when the mind of an ordinary man is affected by the knowledge that

his life is in danger, he does only that which is made natural to him by constant practice ; it is impossible to expect much at such a moment from his powers of reflection.

This is also true of fire-discipline. I have very often observed how in battle, in the presence of danger, fire-discipline falls to pieces. Troops which are not properly instructed do not aim ; they do not even shoot ; they simply make a noise. Even before I had ever seen an action men with experience of war assured me, that it was a proof of a certain standard of training in infantry, if in a hot fight they put their rifles to their shoulders before firing. During the battle of Königgrätz I witnessed some most irregular fire which, as the rifles were held vertical, all went up into the air. I was galloping on in front of my batteries, in order to select the next position to which to lead them. When I, accompanied by my major, some aides-de-camps, orderlies and a trumpeter, reached the heights, I found myself within about 20 or 30 paces of a mass of the enemy's infantry of the strength of about half a battalion ; they had been turned out of Ohlum, which lay on our right, and wanted to get to Nedelist on our left, and thus found themselves between our infantry, who had already advanced beyond them, and my line of artillery. They were as much surprised as we were, and thought that our group of 10 to 12 horsemen where the Staff leading a charge of cavalry. At least they opened an irregular fire. I was quite close, and I saw most of the bullets go straight up into the air. Only one man took aim, and hit the major's horse in the body as he turned to retire ; for we few horsemen could not certainly attack 500 infantry with the sword ; so we hurried back to our batteries and opened fire on them.

But how far more difficult than even this it is to teach infantry during the excitement of battle to attend to words of command and warnings, as to on which target, with what sight and with what description of fire they are to act, whether they are to use volleys or independent fire, and moreover to accustom them to cease firing when they have expended the stated number of cartridges in independent fire. But everyone who has seen even only field-firing on a range knows that the effect of our costly infantry arm is "nil" unless the words of command and the warnings which are given be obeyed.

Certainly much has been done to simplify the use of the rifle. I especially refer to the flat trajectory, which when the enemy is so close that independent fire alone is possible, since the fight then rages so hotly, permits of the use of a single sight, provided that aim is taken at the bottom of the target, *i.e.*, at the feet of the enemy. But if, as I have shown above, it implies a certain degree of fire-discipline when the men will even bring their arms to the "present" before firing, how much more will be needed before they can be made to aim at the bottom of the target.

In other respects also the excellent instructions which are given by the school of musketry demand an extreme amount of self-restraint from men who are highly excited by battle.* Among these I include the limitation of the number of cartridges and the periodical cessation of fire when a rapid fire is ordered, that is to say when the enemy is within decisive range. It is asking very much of a man, who is under the enemy's fire, to expect him to cease fire in return for a certain space

* NOTE.—The latest musketry instructions contain sensible simplifications.

of time. I have under various circumstances experienced with artillery how difficult it was to make the fire cease, when this appeared desirable in order to allow the smoke to disperse, with a view to make observation possible. A fire which has once commenced gets easily "out of hand" unless an iron discipline prevails. How much more difficult must this be in the case of infantry, where the men firing are so much more numerous. It is so natural, so human, that the soldier should find comfort in the noise which his rattling rifle makes. The less a man is trained the more is he inclined to "shoot up his pluck." During the first campaign in which I took part, I was present at an unimportant affair of outposts, after which a lieutenant inspected the pouches of his men. The older soldiers had fired 3, 4, or 5 rounds, but all the recruits had expended over 20. If we take such facts into account some little doubt will steal into our hearts as to whether the word of command "Five cartridges rapid fire," can ever be obeyed in close fighting under 300 yards. This word of command or warning was not introduced among us until after the last campaign. It has not yet been actually tried on active service.

Another kind of fire-discipline has been tried by us since the last war; namely, that of swarm volleys. It seems to me, as a gunner, very advantageous to keep in hand in this way the fire of the infantry, just as well fought batteries act with concentrated strength. This sort of fire proved itself often very good at the manœuvres, where the men are allowed to expend only 10 or 15 cartridges each, and where the smaller charge of the blank cartridges makes less noise. But matters turned out very differently when it came to the fire of masses in field-firing. The officers then, owing to the greater noise made by the ball cartridges, had to raise their voices much more if they hoped to be heard or understood; indeed most of them before the end of the practice were so hoarse that no one could understand a word they said. It is evident that this will be the case, if you realise that a section extended as skirmishers has a greater width of front than a closed company, while the lieutenants are on foot, and cannot therefore so easily superintend the whole line, as can the commander of a company or of a battalion, who is mounted.

It is still more doubtful how far it will be possible to ensure a distinct order, and its execution, to use two or three different sights, as has been laid down under certain conditions. For there will very rarely be sufficient time to see that such orders are correctly carried out. However this point is not of such extreme importance, since the use of different sights is only laid down for long ranges, at which, as a rule, no fire will be opened. Recourse will be had to this system only when particularly compact and deep targets present themselves within the zone of fire; for example, when masses are defiling over bridges. These are exceptional cases, and therefore not such as decide a battle.

Theoretically accurate as are all these speculations which have been started by the school of musketry, and useful as they have been in inducing us to study the nature of our rifle and of our infantry fire, there is yet some little danger that we may in time of peace be taught by them to nurse illusions, whose non-fulfilment at the moment of battle may have a discouraging effect.

It seems to me that a line of skirmishers, which during a hot fight pays so much attention to the shrill whistle of the lieutenant, that it ceases firing for a moment, looks at him, and obeys his sign to rise and

rush on or his order to fire on another target or with another sight, proves at once that it has attained to a high degree of fire-discipline. For this reason complicated things should not be practised too much, but the time should rather be employed in going over simple things hundreds and thousands of times, until they have become second nature to the men and they cannot help doing them. It is not until then that we can safely count upon their being carried out before the enemy. Clausewitz says that everything in war is simple, but that what is simple is difficult.

But though I wish that the exercises of the company should be limited to the simplest and most elementary things and that all tactical, and above all strategical, combinations should be forbidden, yet I do not deny that it should follow some tactical idea, and should, as they say, smell of powder and ball. On the contrary, I should desire that the officer commanding a company, when once he has made such progress that the men know how to obey his word of command, should as often and as long as possible drill in such a manner that he should seem always to have an enemy on the ground before him. He can and should always lessen the tediousness of the march to and from the drill-ground by moving in a fighting formation or with some tactical idea, and should come on to the drill-ground by some movement which might be carried out in war in the presence of an enemy. Even when on the march he will frequently find an opportunity of carrying out here a short combat of skirmishers, and there an attack, while the remainder of the march can be employed in impressing upon the men the elementary forms of the duties of advanced guards, patrols, scouts, &c. Time may thus be saved, and time is money. I gained in my division the very best results, as regards the conduct of field-service, by ordering that no troops were ever to move during peace, whether it were to the drill-ground or on an actual march, without doing so in fighting formation and with some distinct tactical plan.

7th Letter.

THE COMPANY OFFICER.

THE contents of my last letter lead me naturally to speak of the importance of the inferior officers, namely the Captain of the company and the Lieutenant. They are in fact the soul of the whole of the instruction and execution of infantry duty. This is certainly the case in the other arms also, but the very circumstance that, while in the cavalry the strength of a body of troops is counted by horses, and in the artillery by guns, in the infantry alone it is reckoned by men, shows at once that in the latter arm the human physical element is the only important one, and that the influence of their leader on individual men has greater prominence in the infantry. But this influence, this guidance of individual minds, is exercised by the Captain and his Lieutenants, that is to say by the company officers. The N.C. officers are merely an aid to them, carry out what they order, and are themselves derived from the officers; while the higher ranks are too far separated from the men and, owing to the great number of individuals under them, cannot possibly know the peculiarities of each. The company officer alone knows Tom and Harry, or Atkins and Smith. He has instructed him, praised or blamed him, and rewarded or punished him. This is why the soldier confidently follows his officer in battle, and it is his immediate commander who electrifies him and makes him do great deeds. Who has not seen many examples of this in war?

On Easter Monday, 1864, during an outpost fight in front of the Düppel forts, when it was intended to attack the enemy in his rifle-pits by night, and that our troops should occupy the latter, the companies of the 18th and 8th regiments, as is well known, pushed on to the front instead of taking cover, and found themselves at the break of day close up to the forts (which were proof against a "coup-de-main"), whence they had to retire with considerable loss. A soldier from Upper Silesia answered his landlord (who happened to be there as a Knight of St. John), who had blamed him for going so far to the front, by saying in broken German; "But when the Lieutenant runs to the front, we must run with him."

During a fight in a village in front of Paris a churchyard on the flank of the village was held by half a company. The regiment to which it belonged had up to that time performed wonders in hard fighting. All the greater therefore was our surprise when an attack by the enemy cleared the churchyard, so that we had to recover it by storm. After the action I spoke to some of the men who had formed the original garrison of the churchyard, and asked them why they had abandoned it to the enemy. They openly said; "We had no officers left to tell us what to do, and so we went off." The enemy's artillery fire had unfortunately at the very beginning put both officers "hors-de-combat;" one was killed and the other wounded and senseless.

But enough of examples. Every infantry officer who has been in action could give you plenty of them, all showing how in our army the company officer is the soul of the infantry, that he breathes his spirit into them, and with what unlimited confidence our men follow their officers. General von Richel said even in the last century ; "The spirit of the Prussian army is in its officers," and this maxim is even more true now, when the fighting masses of infantry must at the decisive moment break up into their smallest units, such as can be guided only by the voice of a Lieutenant ; so much so, that whereas I in my second letter said that there were good grounds for asserting that not the Prussian schoolmaster but the Prussian N.C. officer won our battles, I am now almost inclined to say that our victories were due neither to the schoolmaster nor the N.C. officer, but to the Prussian subaltern. The Lieutenant is indeed during peace, year out and year in, the schoolmaster of the men. I have in saying this no wish to speak in any way slightly of the work of the senior officers, and I will here remark beforehand that my later statements will show that I fully feel their importance. And even within the limits to which I shall keep to-day I will blunt the point of any unfavourable interpretation which the above, perhaps rather paradoxical, statement may suggest, by drawing attention to the fact that all senior officers have at one time been Lieutenants, and that the Lieutenants hope to be some day senior officers.

But let us to-day confine ourselves specially to the Lieutenant, or rather to the company officer (including the Captain) of infantry, and let us ask ourselves the question ; whence comes this influence on the masses, which generates marvels of courage, and is so powerful that they obey his signs in the greatest danger, even when the dispersion of closed bodies, which is due to the new mode of fighting, renders it impossible to watch and control each individual man ? It arises from the indefatigable activity of the officer, from his spotless honour, and from his Spartan self-denial.

There used to be times of peace, during which an officer appeared to have nothing more to do than to go on guard, to drill in the spring and summer for a few hours of each day, and to run across country at the manoeuvres. In those days the Lieutenant had many nicknames, such as "street-trotter," some of which the people still keep up. But when do you now see a Lieutenant strolling up and down the street ? If you see him at all it will be only at mid-day when he, while the men are at dinner, is on his way to breakfast at some caf or confectioners (for his dinner hour is 3 or 4 p.m.), or perhaps on Sunday, when he is paying visits to his friends. At all other times, from early in the morning to late in the evening, he is hard at work.

When the sun shows itself above the horizon he has to look after his men, to see that they are clean and that everything is in order, and also to give them instruction on such points if they need it. After that he has to teach and drill each individual man in various details. Gymnastics and drill, the handling of arms and musketry, field service and interior economy, he has to teach them all, while in each of them he must be a model to the men, since they will not learn anything unless the officer knows it better than they do. In this manner he is hard at work during the whole day. Anyone who only now and then, as he passes by, glances at the drill-ground, may perhaps think that these simple exercises can easily be learnt in a few hours. The infantry officer knows how much trouble and work they need, and anyone who, without prejudice,

has read my earlier letters, will acknowledge it, even though he is not a soldier, especially when he thinks of how much time must be given to musketry instruction. A company fires from 15,000 to 20,000 rounds per annum at a target, and not a single shot may be fired unless an officer be present; he is responsible for all measures of precaution, and each shot must be entered under his eyes in the practice-report. A company has rarely more than two officers available for this duty. What a demand this must make upon the nerves, the stamina and the sense of duty of an officer, for he must never weary and never allow his attention to wander, while he has to stand for many hours together in all kinds of weather, in winter as well as in summer, in snow and frost, as well as in sweltering heat, and shot after shot, has to watch the manner in which a man aims, to see that all due precautions are taken, and that each score is correctly entered. For if there is the slightest neglect, an accident may easily happen, and then the responsible officer will be sent before a court-martial. Moreover, he often has to carry out this duty against the will, and under the opposition of the civilian population, and even of the civil authorities. For it has sometimes happened that the local authorities have presumed to officially forbid the continuation of the practice, because some rifle has been by accident fired up into the air, and the ground behind the butts is not considered safe. Indeed, the zone of infantry fire is now very deep. We have, in action, had men wounded by chance shots, at a range of 4,000 paces from the enemy's skirmishing line.

Many people imagine that a Lieutenant is at leisure when he has completed his work of the morning and the afternoon, and goes to his dinner at 4 p.m. On the contrary! Hardly has he finished his dinner than he has to give theoretical instruction to either the N.C. officers or the men. The soldier in the "Fliegender Blätter" certainly says that theoretical instruction is that which is not practical, but a subaltern laughs at this as a good joke, all the more heartily that he knows that this is only exceptionally true. In military matters, this kind of instruction is absolutely necessary, while it is not confined to military matters only. Many things are taught which are of the greatest use to a man when he leaves the service, while the few men who join unable to read or write are then taught to do so. Many men learn more with their regiment than they did during the whole of their time at school. I remember when I was a Lieutenant, we had a recruit whose education had been totally neglected, but who was otherwise clever enough; I taught him reading, writing, and arithmetic, and he became first a sergeant, and afterwards a paymaster's clerk. The results obtained by regimental instruction are far more marked than those of any school, since the average age of the men is over 20 years, and they therefore work harder, and understand better the use of instruction than school children do. For this reason also they feel more attachment to the instructor of their riper years, and are willing to follow his orders through toil and danger, if only he will set them the example.

But even this is not all that a subaltern has to do. In addition to the duties of his profession he must study that profession itself. He must exercise himself at gymnastics, he must read, he must speak at discussions, in addition to attending among the audience at all regimental meetings, he must send in memorandums on various subjects, and must take a part in the tactical war-game. His evenings, after he has finished the instruction of the men, are three or four times a week

employed in this manner, so that the remaining evenings only are available for recreation and for intercourse with his family or his comrades. The demands made upon the subaltern officers are increasing to such an extent, that when one of them succeeds in getting into the War Academy, he looks upon the time spent there in earnest and hard study as a relaxation from the burden of regimental duty.

But of the company officers the Captain is even harder worked than the subaltern. He shares all the fatigue of his officers, and, while the latter have to do special duties, he has to go from one to the other to supervise them, and, in the case of the inexperienced younger subalterns, to instruct them and teach them their work. When he returns home to his family, or hopes for an hour of rest, his sergeant-major appears and reports to him to-day some crime, which he must carefully inquire into, punish and enter in the defaulter book, and to-morrow some question connected with pay. On another day he must go to the clothing-store to issue uniform, or perhaps he has to stop disorderly conduct in the barrack-rooms; for down to the smallest detail he is answerable for everything which concerns his company, and must have everything at his fingers' end. It has thus become a proverb that the life of an officer commanding a company is not his own, since he never has time to enjoy it.

I know very well that the same ranks in the other arms are quite as hard worked. But the subaltern of infantry has to run about on foot, while the cavalry and artillery officer rides, and is thus saved very great fatigue at drills and manœuvres. The former therefore expends far more strength at his work.

But these exertions and fatigues would not of themselves alone enable the officer to obtain such an enormous influence over the mass of his men, if he did not cling so fast as he does to his stainless honour, and unless the private soldier knew that he could entirely trust himself to this spotless honour of his officer. The soldier recognises that in this respect the officer is superior to him; he does not ask the officer to set him a good example, for he knows that he will do so, and that to maintain this honour he will always be to the front in danger; thence arises a feeling of attachment, and of the impossibility of leaving his officer in the lurch, and thence also that spirit among the men which finds its expression in "When the Lieutenant runs to the front, we must run with him." I should have to write volumes if I wished to state how far the influence of the sense of honour among the officers extends in this respect, while to do so to you would be to carry owls to Athens. The elevated standpoint which the honour of an officer occupies is the object of the highest esteem on the part of all educated civilians, and is the object of the envy of all those who desire to destroy our existing social and political institutions. How they rejoice and shout when, quite as an exception, it happens that one or another out of the tens of thousands disgraces himself. How full the papers are of it for a long time, and how vainly do they endeavour to involve the whole service in the shame. Vainly, I say, for the service is stainless. It casts out such an individual from its ranks without any regard to consequences, and without ever allowing him to return; and it gains in position by this openness and disregard of consequences, since it does not hypocritically display a mere outward garment of honour, but clearly shows its inward determination to hold fast to its reputation.

There can be no better evidence of the spotless honour of officers as a class than the bitter hatred of such men as, being themselves destitute of all honour, wish to destroy everything which the bonds of the family and the Fatherland have hallowed. But we ask those who, even though they are not military men, yet desire the stability of these bonds, to give a noble answer. We hear much of the envy which is felt of the privileged class of officers, yet every citizen is proud if he can number an officer among the members of his family, and everyone is glad to receive an officer into his house, while every place which officers frequent is, from that fact alone, assumed to be one where a good tone prevails.

I know very well that as far as regards the question of honour there is no difference between officers of infantry and those of the other arms, and I hope that the latter will not blame me for having spoken especially of the infantry while touching on this point. For the officers of infantry are in the greatest number, and, moreover, they are the best examples of the third reason upon which the influence of the officers over the men depends, *i.e.* in their Spartan self-denial, while this self-denial, necessitating great efforts, is an expression of their sense of honour. There are certainly many officers in the cavalry who are as frugal as those of the infantry, but we find as a rule that officers who are well off prefer the cavalry, and these do not have to exercise the same self-denial.

On the other hand the greater number of infantry officers are poor, sadly poor, and the pay which recompenses their ceaseless activity is extremely small, so small that the greatest statesman of his time among us spoke, when he was a deputy, of the "splendid misery" of a subaltern. Even now the pay of a Lieutenant is so exceedingly scanty, that anyone who does not receive assistance from his family undergoes the most bitter privations, which he endures silently in his quarters, while publicly he keeps up the position of his rank.

It cannot be denied that many families, when they allow their sons to select a military career, contrive by some means to give them assistance in money as long as they are subalterns. But many cannot do this. I have known young officers, who joined from the Cadet corps, whose mothers, themselves the widows of officers, could once and for all assist them in their new rank with only the sum of fifteen shillings and an old coat belonging to their father; others I have known, of a good, old and noble family, who had not even these fifteen shillings, and whose sisters counted upon some assistance from their pay as Lieutenants. Thus it happens sometimes that an officer, who has in the evening been invited to tea with a family, shows such an appetite for bread and butter as amuses everyone, while later on, when things are going better with him, he may, perhaps, own that the reason that he was so hungry on that evening was that, being very hard up, he had eaten nothing all that day. Another again, for his evening meal, will buy ration bread from his *bâtman*, who is much better off than he is, giving as his reason that it is good for his health, but really because it is the cheapest. It is scarcely necessary to say that these officers freeze in their rooms, for they have no money to buy fuel, and that they do not wear their cloaks in the coldest weather, because if they did they would wear out their coats too quickly; they give out that they dislike to wear such warm clothes. But if it is a question of appearing in the streets or on parade, or if he has to go into society, then our Spartan is

the best dressed and the gayest of all. Do not tell me that there are exceptions to this rule, and that there are officers who, infected with the generally prevailing love of pleasure, waste their money, and the property of their families, and at last come to grief. How could it be possible but that here and there an officer should suffer from the prevailing epidemic? But the exceptions prove the rule, while the sensation which such exceptions excite, is the greatest possible proof that we expect Spartan manners in our subalterns, and that we find them.

But how does the private soldier feel with regard to such an officer? He is filled, not with pity, but with admiration. He hears at once from the *bâtmen*, his comrades, of the circumstances of the officer. And when he sees that the Lieutenant is comparatively poorer and worse paid than he is himself, and that he can afford himself less enjoyment and fewer pleasures, but that at the same time he is his master in knowledge and acquirements, and is a model for him in danger, how can he help being seized with emulation?

Indeed a Lieutenant is very badly paid. A skilled artisan, whether he be a locksmith, a cabinet maker, a turner, or a shoemaker, earns more in a week than a subaltern, to say nothing of such trades as require special technical knowledge, and which are far better paid. Why then is it that our Spartan does his duty? Why does he expend the cost of his elementary instruction, which would fit him for any other career; why does he show an extraordinary and unresting activity in peace; why does he give his blood and his life in war; when after all this he can expect no recompense? He is influenced only by his desire for fame and glory, and by the high position which the spotlessness of his true honour wins for him in the society of all men.

So long as the rank of an officer holds, even in the case of Lieutenants, this exceptionally honourable position, which in spite of his youth gives him the entry into all circles of society, so long will it retain its force of attraction for the most cultured classes. If this position were taken away the very highest rates of pay would not make good the harm done, for gold can never take the place of honour. He who lives only for money and pleasure may say with Falstaff; "What is honour? Air!"

The above-mentioned honourable position which the rank of officer holds in general society in Germany is naturally a subject of envy to all other professions, and that rank is therefore, especially up to within the last 20 years, distasteful to them. After the attacks which were made upon it had failed of their effect, an endeavour was made to turn it into ridicule. This animosity has latterly much decreased, a change which began after our victories over the enemy. When I returned to Berlin after the war of 1866, a well-known man of business and a genial burgess of Berlin asked me to explain the following facts; the burgesses of Berlin used formerly to think the officers of the Guard haughty and exclusive gentlemen, and were really troubled about the return of such victorious warriors. They gave them, as seemed proper after such deeds, a grand entertainment, during which they discovered that they had to do with the most modest and charming men in the world. I could only say to the good man that this showed how very far wrong they had previously been in their estimate of the officers of the Guard. Another reason for the cessation of the animosity against the rank of officer is, in my opinion, to be found in the institution of officers of the reserve. Owing to the realization of universal military service it has become customary for every educated and honourable man, if he cannot

serve a few years as an active officer, to endeavour to be at least an officer of the reserve. How can he feel animosity against a class to which he himself to a certain extent belongs? How is it possible for "The People in Arms" to hate its leaders?

It is certainly true that the typical figure of the ornamental Lieutenant of the Guard still exists; he still twists his sprouting moustache, speaks through his nose and cannot see without a glass in his eye. He still appears now and then on the scene, and make one's sides ache with laughing, whether or not he wears the lace of the Guard. But as a matter of fact he has nearly disappeared. But when here and there he does come to light, as a sort of excrescence of exaggerated regard for honour and elegance, experience has taught us that men like him are exactly those who in moments of danger, or in the midst of fatigues and hardships, make it a point of honour to prove themselves good men and to show well to the front. So, though we may laugh at the comic side of the man, we must admire the very extravagance of his feelings.

Why do I write this to you, who know it as well as I do? It is because I feel that, after the attacks which were made last year even in the "Reichstag" against the honour of the army, no one of us should keep silence if he has any opportunity whatever to bear witness as to the true state of the matter, and that we should all give expression to the wish that this spirit in the army may long be maintained. I have tried to investigate the causes which have led to the successes of our infantry, and, as I have said, I have found that one great cause was the spirit of the officers as a class, which finds its expression in their unwearied activity in the discharge of their duty, in their stainless honour and in their Spartan self-denial.

8th Letter.

BATTALION EXERCISES.

AS, in my earlier letters, I have discussed the individual stones which form the foundation of that magnificent building, our infantry, so will I pass on to-day to the principal story, the companies combined into the battalion.

The battalion exercises are divided into two parts, namely, the elementary movements laid down in the regulations and the combat. The regulations give all necessary directions for both. Those concerning the combat are so elastic, that they adapt themselves to all circumstances and are not only entirely sufficient, but could also scarcely be better thought out, with the object of affording the necessary guidance, while at the same time they leave free scope to the individuality of each leader, and fully develop that independence of the junior officers which is so needful when fighting in extended order. Often as I have examined these regulations, I can still not refrain from astonishment at the spirit which inspires them, and which gains its full expression in paras. 112 and 127 ; of these the latter, it is true, is laid down for the brigade, but it yet applies equally well to the battalion.

And yet we find frequently, and even generally, that it is especially these most important paragraphs of the regulations which are not observed during the exercise of a battalion. On the contrary, as the lapse of years tends to separate us from our last experience of war, the exercise of a battalion becomes every day more rigid, more of a sealed pattern, and more based on systematic routine, except indeed where the influence of the inspecting officers strives against such rigidity, insisting that the letter shall be subservient to the spirit, and be ruled by it. But this is very difficult, for this rigidity and routine are not products of indolence, but are due entirely to the exaggerated zeal of the officers commanding battalions.

In consequence of this, the style and the manner in which the officer commanding works his battalion, tends daily, more and more, to differ from anything which he could by any possibility carry out in action. While this very fact is caused by his most earnest endeavour to bring his battalion to the highest possible standard of perfection.

I will give you some examples in detail, in order to make good my assertion.

Although on page 152 the regulations expressly say that when under an effective fire from the enemy, the employment of a battalion column can be permissible only under exceptional circumstances, yet during the greater part of the exercise of a battalion, we find the extension of the skirmishing line carried out from battalion column, and we see these skirmishers come at once into action, while the battalion, which is still in column, is standing so close in rear of them, that it absolutely must suffer from the same fire which strikes them. At the very best the

flank companies are sent out, and then an effort is made to keep to the normal formation by placing the centre companies exactly in rear of the middle of the intervals.

We seldom find any use made of the permission to send out whichever companies, and as many as you please (a practice which is ordered by para. 111), or any advantage taken of the directions of para. 112; at the best some movements are made at the close of the drill with the companies in two or three lines, and then without any effort to represent their employment in action.

Take again the simple reinforcement of a skirmishing line, which is firing lying down. According to the regulations the units are as far as possible to be kept intact, while the mixture of the skirmishers of different commands is to be avoided. But when a fresh section advances in extended order to reinforce a firing line, most of the men who are lying down on the position in question at once rise up, and move left and right to make room for it. Could such a movement to a flank be possible, if the fight were so hot as to necessitate the advance of reinforcements? Would not these skirmishers, who all stand up and move together to a flank, be certainly sacrificed to the enemy's bullets? Might not the sections which are first extended leave from the beginning an interval between them for the use of any reinforcements which may become necessary? If that were done would they not, on that very account, be more easily directed as regards the working of their fire, since they would not be so much dispersed and would thus be easier to command? Would they not also, by keeping together in groups, have a better chance of finding cover behind such features as the ground might offer. This fault is especially common when several battalions are working together as a brigade. In that case the skirmishers are often ordered to cover the whole front, and are directed to extend to such an interval from each other, that the individual men may be equally distributed along the front of the whole line of battle. They are thus often at intervals of ten paces, while the regulations lay down six paces per file, or three paces per man, as the maximum interval. As if it could do any harm if at any time there should happen to be an interval of 200 paces between two extended sections, and as if an enemy could hope to get through this interval alive!

Again; how often do we find an officer commanding a battalion, who is willing to leave it to the officer in charge of the skirmishers to decide, according to the intensity of the fight, whether he shall order independent fire, rapid fire, or swarm-vollies, or shall lay down the number of cartridges to be used? Or how often do we meet with such an officer who will permit the companies which are following in support to take up, according to circumstances, the one a column, the other a line formation, or vice versa? Will he not always prefer to make both companies move in the same formation, for the sake of uniformity and of a good appearance? But in action could he be in a position to thus take command of everything everywhere?

Of such routine movements as the regular character of the drill-ground easily tempts us to use, but which destroy all initiative, I will mention only one. When a battalion, after it has been broken up to fight in skirmishing order, sounds the "assembly," with a view to form in column on the centre (which is as a rule done at the termination of the exercises), it ordinarily fronts towards the end of the drill-ground, since

it usually ends by marching past. A battalion is rarely practised in quickly assembling on a somewhat oblique front, and it gets very confused, and also expends an unreasonable amount of time, if it be required to assemble fronting this tree or that church tower. But it ought to be able to do this quickly if its training is to prepare it for war; otherwise much time will be wasted and the men will be fatigued, if it is ever necessary to adapt the troops to the ground, for example, to place them under cover behind an undulation.

There are an endless number of such drill-ground habits, not to mention little aids and dodges, all absolutely impracticable in war, which assist in making the drills correct and smart. Every soldier knows them, and I will not trouble you by speaking of them, but will pass on at once to the conduct and behaviour of the officer commanding the battalion.

At the commencement of the field exercises the officer commanding the battalion will certainly be found, mounted, near that one of the skirmishers who fires the first shot, and who himself must find cover by lying down. He remains in the skirmishing line during the whole fight, and if perhaps he realises that he really could not fail to be killed there, he retires at the farthest to some point between the skirmishers and the nearest support. From this place he gives words of command and directs signals to be made. But if any movement, a flank attack, or a reinforcement, is to be made, he is certain to ride up himself and give orders for everything. Above all he will be sure to do this if a mistake has once happened, if an order has not been correctly delivered, or the wrong description of fire has been used, or if anything is done contrary to his wish. He ought to be declared killed hundreds of times in the space of an hour. He goes to every point, except just to the very one where he ought to be during the whole duration of the action (if it were a real one), that is to say to that company which he has told off as his last reserve, and which alone he should accompany into the foremost fighting line, unless he wishes prematurely to hand over the command of the battalion; this company he never goes near.

Proceedings like these, arising from life on the drill ground and totally false to nature, raise very dangerous illusions in the minds of all those who have no experience of war. For they think that things really happen like this in war, and easily lose their heads when they find that in real work time and space do not fit in with the ideas, which they have formed from their experience on the drill-ground. And there is more even than this. The men, who have been accustomed to see the Lieutenant-Colonel* well to the front, begin to make remarks if, as soon as the bullets whistle, he remains in rear with the reserve company; the consequence of this is that, at any rate in the first action, in which he takes part, the field-officer must certainly ride where he has been in the habit of riding, in order to avoid giving occasion for such remarks.

It is true that a General of high rank and a participator in the war of independence once said, in the year 1850, in a criticism (in which he blamed such impossible proceedings in his peculiarly biting manner), that he was confident that the first bullet would set everything right. But his conviction was not realized. At the battle of St. Privat the field-officers actually did ride where they had been in the habit of

* NOTE. In the original this is the "Herr Major;" I have ventured to translate it as above, in accordance with our system of command. N.L.W.

NOTES:

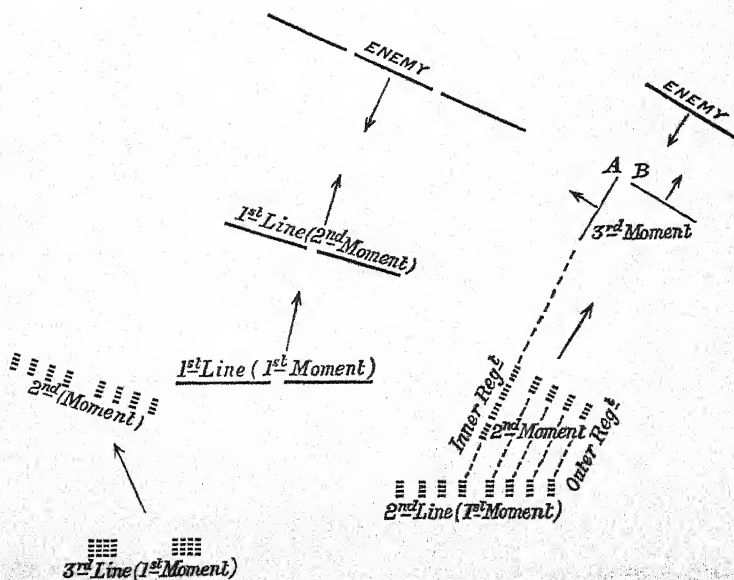
BY VARIOUS HANDS.

"LETTERS ON CAVALRY."

COLONEL BOWDLER BELL, D.-A.-A.-G., Intelligence Division, War Office, has kindly sent the following explanation of the question referred to in the note at the foot of page 96 of the Translation of the "Letters on Cavalry."

In German drill the "outer" flank is that which is the nearer to the enemy, and which is therefore the more exposed flank. Thus, in the hand-sketch below, which is merely intended to give a general view of the situation, the right is the outer flank of the Division and of all the units composing it.

In the case in point, the German Cavalry Regulations of 1876 (Para. 197) lay down that the inner Regiment of the 2nd Line will advance obliquely in column of *züge* (=half troops,) and will in due time wheel into line, as at A, to roll up the enemy's left flank, while the outer Regiment will form "flank attack" and will therefore advance obliquely towards any support of the enemy, as at X. It is evident that, if these movements are ill-timed, the inner Regiment, after wheeling into line towards the left flank of the enemy's 1st Line, might have its own right (outer) flank rolled up, while the outer Regiment might be caught on its inner (left) flank, B. The inner Regiment would not, of course, wheel into line until it could take the enemy's 1st Line in flank; but it might itself be caught in the act by the left flank squadrons of the enemy's 1st Line, or by troops in 2nd line.



EXTRACT FROM LETTER OF CAPTAIN W. L. WHITE TO SECRETARY, R.A.I.

. In my paper, in the October number of the Institution Proceedings, on the subject of the "Fire of Shrapnel Shell against Troops under Cover," I inadvertently made a statement which is misleading, with reference to the hut before which the late General Earle lost his life at Kirbekan. Lieutenant Crawford, R.A., who was present at the action, has kindly put me right on the subject. The hut was of stone, and not of mud as stated by me, and the 42nd having completely turned it rendered its reduction by Artillery fire impossible, without seriously endangering the safety of the Infantry who were beyond it.

SHOEBURYNESS,
November, 1888.

NOTES ON PRELIMINARY TACTICS.

GRATIS copies (postage to be paid) of Major E. Baker's "Notes on Preliminary Tactics," can only be obtained before the 1st April next.

These books can be purchased at the Institution for 2s. each.

OBITUARY.

COLONEL Francis Duncan, C.B., R.A., expired at his residence on Woolwich Common, at half-past 8 o'clock a.m. on the 16th inst., aged 52 years. He was Member of Parliament for the Holborn Division of Finsbury, which he had represented in the House of Commons since 1885. Col. Duncan, C.B., LL.D., D.C.L., was born in 1836, and was educated at Aberdeen University (M.A. in honours, 1855); was Hon. D.C.L. of King's College, Canada, 1861; Hon. LL.D. Aberdeen, 1874; and Hon. D.C.L. Durham, 1882. He entered the Royal Artillery by direct commission in 1855, being at the head of the list of candidates who came forward in response to the demand for officers during the Crimean War. He attained the rank of captain in 1864, major in 1874, and lieutenant-colonel by brevet in 1881. After being specially employed with the Egyptian Army during the war in the Soudan from January 1883 to November 1885, during which time he was instrumental in passing great numbers of fugitives down the Nile, he returned to England, was made colonel in the Army, and received his C.B. from Her Majesty the Queen. He was put on half-pay in October 1887, and was, in February 1888, appointed an Associate Member of the Ordnance Committee. The name of this distinguished officer is closely connected with the R.A. Institution, in that he was the founder of the Gold Medal in 1870; for the furtherance of this object he placed 50 gs. in the hands of the Committee on the understanding that his name should not at the time transpire. He is well known as the author of the "History of the Royal Artillery," "The English in Spain," and other works.



CRICKET, 1888.

ROYAL ARTILLERY v. ROYAL MARINES.

CHATHAM, 16TH AND 17TH JULY.

ROYAL ARTILLERY.

Major Anstruther, c Hast, b Crowther	...	...	...	18
Lieut. Adair, b Archer	...	...	...	9
Bombr. Barton, b Bedford	...	...	...	47
Lieut. J. Haggard, b Bedford	...	...	...	10
Capt. Wheble, b Archer	...	...	...	17
Corpl. Pearson, c Raitt, b Archer	...	...	...	3
Lieut. A. Cooper-Key, c Poole, b Bedford	...	...	...	0
Lieut. H. Jenkinson, b Bedford	...	...	...	4
Gunner McKinlay, std. Parkes, b Archer	...	...	...	5
Lieut. Powell, c Bedford, b Archer	...	...	...	4
Lieut. Hon. Selater-Booth, not out	...	...	...	4
Byes, 14; leg byes, 3; wides, 4	...	...	...	21
Total	...	...	...	142

ROYAL MARINES.

<i>1st Innings.</i>				<i>2nd Innings.</i>			
Lieut. Crowther, c Barton, b Adair	...	...	2				
" Brittan, c McKinlay, b Adair	...	...	10	b McKinlay	...	...	2
" Raitt, b Adair	...	...	72	b McKinlay	...	...	22
Capt. Quill, b McKinlay	...	...	0	not out	...	...	57
" Roberts, c Wheble, b Adair	...	...	4	b McKinlay	...	...	43
Sergt. Bedford, lbw. McKinlay	...	...	4	not out	...	...	0
Lieut. Curteis, b Adair	...	...	1				
" Parker, b McKinlay	...	...	0	b Adair	...	...	3
" Poole, b Wheble	...	...	3				
Capt. Hast, b McKinlay	...	...	13				
Gunner Archer, not out	...	...	5				
Bye, 1; leg byes, 3; no ball, 1	...	...	5	Byes, 6; leg byes, 1	...	...	7
Total	...	...	119	Total	...	...	134

ROYAL ARTILLERY v. ROYAL ENGINEERS.

WOOLWICH, 27TH AND 28TH JULY.

ROYAL ARTILLERY.

<i>1st Innings</i>				<i>2nd Innings.</i>			
Lieut. J. Haggard, c Dumbleton, b Fellowes	...	...	9	b Hedley	...	...	11
" H. R. Adair, c Druitt, b Hedley	...	...	0	b Hedley	...	...	7
Bombr. Barton, c Dumbleton, b Fellowes	...	...	24	c Liddell, b Fellowes	...	...	1
Lieut. C. D. King, b Hedley	...	...	5	b Hedley	...	...	37
" P. H. Dorehill, not out	...	...	38	lbw. Hedley	...	...	3
Capt. Wheble, b Fellowes	...	...	7	b Pilcher	...	...	3
Major Anstruther, b Fellowes	...	...	11	not out	...	...	34
Capt. Curteis, b Pilcher	...	...	4	b Hedley	...	...	3
Lieut. F. H. Crampton, b Pilcher	...	...	0	c Liddell, b Hedley	...	...	1
" E. Cooper, c Dumbleton, b Pilcher	...	...	2	c Burnaby, b Hedley	...	...	0
" J. MacMahon, b Fellowes	...	...	4	c Dumbleton, b Pilcher	...	...	4
Leg byes	...	...	11	Leg byes	...	...	3
Total	...	...	115	Total	...	...	107

ROYAL ENGINEERS.

<i>1st Innings.</i>		<i>2nd Innings.</i>	
Lieut. C. G. Burnaby, c MacMahon, b Adair	0	b Crampton	25
" W. C. Hedley, b Barton	1	c Curteis, b Adair	10
Capt. Dumbleton, b Adair	9	c King, b Adair	1
Lieut. P. J. J. Radcliffe, c MacMahon, b Adair	12	c Wheble, b Adair	2
" J. S. Liddell, c Cooper, b Adair...	35	b Crampton	11
" H. O. Lathbury, b Adair	0	b Crampton	9
" E. Druitt, c King, b Adair... ..	16	b Crampton	4
" C. Ainslie, b Adair	1	c Cooper, b Crampton... ..	0
" A. J. Pilcher, not out	30	not out	12
" H. R. Stockley, b Crampton	5	not out	0
Lieut.-Col. Fellowes, c King, b MacMahon...	30	did not bat	
Leg byes, 5; wide, 1	6	Bye, 1; leg byes, 2; wide, 1 ...	4
Total	145	Total	78

ROYAL ARTILLERY v. I.Z.

WOOLWICH, 6TH AND 7TH AUGUST.

I.Z.

H. F. de Paravicini, b Adair	15
Major J. Spens, c Anstruther, b MacMahon	47
C. C. Clarke, b Staveley	0
C. E. Cottrell, b Wheble	64
H. H. Prince Christian, c Haggard, b MacMahon ...	25
H. Eaton, not out	59
W. Marshall, b Anstruther	12
Horace Hutchinson, run out	9
Major Stephenson, lbw., King	9
R. Alexander, c Anstruther, b Wheble	4
Byes, 8; leg byes, 6; wide, 2	16
Total	280

ROYAL ARTILLERY.

<i>1st Innings.</i>		<i>2nd Innings.</i>	
Lieut. C. D. King, c and b Alexander	6	c Clarke, b Alexander	41
" H. R. Adair, c and b Marshall	50	b Clarke... ..	19
Bombr. Barton, c and b Alexander	12	b Spens	11
Major Anstruther, c H. Hutchinson, b Prince Christian	20		
Lieut. J. Haggard, b Cottrell... ..	18		
Capt. Curteis, run out	6	not out	18
Lieut. W. C. Staveley, b Cottrell	2		
Capt. Wheble, c Alexander, b Spens	39	not out	16
Major Kaye, not out	1		
Lieut. J. MacMahon, b Marshall	0		
" Hon. Slater-Booth, b Marshall	0		
Leg byes, 4; wide, 3	7	Byes, 12; leg byes, 1	13
Total	161	Total	118

ROYAL ARTILLERY v. INCOGNITI.

WOOLWICH, 8TH AND 9TH AUGUST.

ROYAL ARTILLERY.

<i>1st Innings.</i>		<i>2nd Innings.</i>	
Lieut. H. R. Adair, lbw., Lake	2	lbw. Lake	42
Bombr. Barton, b Lake	17	c Paine, b Lake	0
Lieut. J. Haggard, b Lake	6	b Lake	8
" C. D. King, b Paine	61	c Oxley, b Lake	79
Major Anstruther, b Lake	2	b Lake	6
Capt. Wheble, b Lake	0	c and b Lacey	0
Col. Hutchinson, c Lake, b Paine	0	b Lake	2
Bombr. Paitson, b Lake	4	not out	0
Major Kaye, b Paine	5	b Lake	0
Lieut. J. MacMahon, c Smith, b Lake	1	c Pontifex, b Lake	6
" Hon. Sclater-Booth, not out	16	b Lake	2
Byes, 7; leg byes, 4; wide, 1	12	Byes, 9; leg byes, 5; wide, 1	15
Total	126	Total	160

INCOGNITI.

Mr. D. D. Pontifex, c and b Adair	16	c Wheble, b Adair	2
Mr. C. Lake, b Wheble	24	c and b King	26
Mr. F. H. Lacey, c Barton, b Wheble	4	b Paitson	21
Rev. P. H. Smith, b Adair	7	run out	23
Mr. M. H. Paine, c Barton, b Wheble	0	b King	7
Mr. R. F. Oxley, b Wheble	7	b King	10
Mr. R. C. Nystrom, c King b Adair	1	run out	12
Mr. G. Rimington, b Anstruther	12	c Barton, b King	7
Mr. G. K. Anderson, c Wheble, b Adair	5	b King	18
Mr. G. H. Windeler, b Wheble	0	not out	12
Lieut.-Col. Bircham, not out	11	b King	6
Byes, 1; leg byes, 1	2	Leg byes, 4; wide, 1	5
Total	89	Total	149

ROYAL ARTILLERY v. FREE FORESTERS.

WOOLWICH, 17TH AND 18TH AUGUST.

FREE FORESTERS.

<i>1st Innings.</i>		<i>2nd Innings.</i>	
Hon. F. Thesiger, b King	102		
Mr. A. J. Thornton, c King, b Barton	64	not out	
Mr. G. W. Ricketts, b Barton	14		
Major J. Spens, b King	9		
Mr. G. F. Vernon, c Adair, b King	6		
Mr. E. W. Collins, b Adair	40		
Major Spens, c King, b Adair	14		
Mr. A. M. Inglis, c King, b Barton	25		
Mr. W. D. Bovill, b Adair	1		
Mr. C. Hickley, b Barton	4		
Capt. Cockburn, not out	5	not out	4
Byes, 1; leg byes, 1; wide, 2	4		
Total	288	Total	6

ROYAL ARTILLERY.

Major Anstruther, c Vernon, b Thornton	21	b Bovill	3
Lieut. H. R. Adair, c Ricketts, b Hickley	33	c Vernon, b Hickley	17
Bombr. Barton, run out	11	b Ricketts	0
Qr.-Mr.-Sergt. Hunter, b Ricketts	11	not out	14
Lieut. C. D. King, b Ricketts	5	b Collins	36
" J. Haggard, c Vernon, b Ricketts	1	b Collins	0
Capt. Wheble, b Bovill	28	c Ricketts, b Collins	36
Lieut. J. MacMahon, c and b Ricketts	1	c Spens, b Thornton	13
" Hon. Sclater-Booth, not out	18	c Bovill, b Hickley	6
" H. L. Powell, c Vernon, b Bovill	11	b Bovill	6
Capt. Pratt, b Thornton	3	c Spens, b Thornton	0
Byes, 9; leg byes, 2	11	Byes, 3; leg byes, 2	5
Total	157	Total	136

ROYAL ARTILLERY, WOOLWICH, v. CHARLTON PARK, C.C.
WOOLWICH, 22ND AUGUST.

ROYAL ARTILLERY.			CHARLTON PARK.		
Lieut. J. Haggard, b A. J. Newsome...	..	54	F. W. P. Holton, c Barton, b Adair ...	..	7
Bombr. Barton, c Holton, b Zambrano ...	..	35	A. J. Newsome, c Stephenson, b Barton ...	..	31
Lieut. H. R. Adair, c and b Newsome ...	..	23	G. Turner, c Chapman, b Barton ...	..	34
Major Anstruther, c Risch, b Zambrano ...	..	20	Capt. McCanlis, c Wheble, b Adair ...	..	0
Capt. Wheble, c and b Risch ...	..	10	A. P. Zambrano, not out ...	..	29
Lieut. J. MacMahon, c Lovey, b Zambrano	..	10	A. Lovey, c Stephenson, b Anstruther ...	..	6
" H. Calley, c and b Zambrano ...	..	3	G. D. Whitfield, b Coxhead ...	..	1
Major Stephenson, c Lawrence, b Risch ...	..	0	G. Risch, b Anstruther ...	..	0
Major Beaver, b Risch ...	..	1	G. A. Redman, b Anstruther ...	..	0
Capt. Dale, c A. C. Newsome, b Zambrano	..	22	A. C. Newsome, not out ...	..	3
Lieut. T. L. Coxhead, not out ...	..	5	H. E. Lawrence, }	} Did not bat.	
Capt. Chapman, b Risch ...	..	0	W. J. Keats, }		
Byes, 4; leg byes, 1 ...	..	5	Byes, 4; wide, 1; no ball, 1 ...	..	6
Total ...	..	188	Total ...	..	117

OFFICERS v. NON-COMMISSIONED OFFICERS.

WOOLWICH, 25TH AUGUST.

1st Innings.		OFFICERS.		2nd Innings.	
Col. Hutchinson, c Hunter, b Barton ...	..	4			
Major Anstruther, c Spence, b Cochrane ...	..	7	not out ...	..	6
Capt. Wheble, not out ...	..	40	not out ...	..	26
Major Stephenson, b Barton ...	..	10	c Crowe, b Cochrane ...	..	8
Lieut. H. Calley, b Barton ...	..	2			
Capt. Pratt, c Spence, b Barton ...	..	8			
" de Robeck, b Barton ...	..	9			
Lieut. T. L. Coxhead, run out ...	..	0	c Howard, b Norris ...	..	16
" A. Crawford, b Barton...	..	0			
" A. S. Buckle, b Barton ...	..	0			
" H. O. Vincent, b Hunter ...	..	2			
Byes, 1; leg byes, 1...	..	2	Byes, 1: leg byes, 1 ...	..	2
Total ...	..	84	Total ...	..	58

NON-COMMISSIONED OFFICERS.

Bombr. Barton, c Stephenson, b Pratt ...	..	24
Corpl. Cochrane, b Pratt...	..	37
Sergt. Howard, b Pratt ...	..	0
Sergt.-Major Hunter, b Wheble ...	..	66
Bombr. Paitson, b Wheble ...	..	2
Sergt. Dovey, c Wheble, b Pratt ...	..	12
Sergt.-Major Spence, c Calley, b Hutchison ...	..	7
Sergt. Norris, b Coxhead ...	..	4
Bombr. Crowe, not out ..	..	17
Bombr. Fulcher, c Vincent, b Coxhead ...	..	0
Sergt. Green, c Stephenson, b Coxhead ...	..	5
Byes, 8; leg byes, 2; wide, 2 ...	..	12
Total ...	..	186

RESULT OF MATCHES.

Matches played, 16. Won, 4. Lost, 5. Drawn, 7.

Opponents.	Where played.	When played.	R. A.		Opponents.		Remarks.
			1st Innings.	2nd Innings.	1st Innings.	2nd Innings.	
Won.							
R.M. Academy	Woolwich	4 5 June	172	187	196	160	Won by 6 wickets.
B.B.	"	22 23 June	255	47	171	130	" 3 "
Royal Engineers	Chatham	6 7 July	130	82	135	57	" 26 runs.
Incogniti.....	Woolwich	8 9 Aug.	126	160	89	149	" 48 "
Lost.							
Green Jackets	Woolwich	18 19 June	126	165	133	247	Lost by 94 runs. [runs
Household Brigade ...	Chelsea	25 26 June	103	61	206	—	" 1 Innings & 37
Green Jackets	Winchest'r	18 19 July	84	61	133	102	" 95 runs.
Royal Engineers	Woolwich	27 28 July	115	107	145	*78	*For 8 wickets.
N.-C. Officers, R.A. ...	"	25 Aug.	84	*58	186	—	*For 2 wickets. 102 runs on 1st Innings.
Drawn.							
Aldershot Division ...	Aldershot	25 26 May	161	*182	364	—	*For 9 wickets.
N.-C.-Officers, R.A.	Woolwich	2 June	*98	—	275	—	*For 6 "
Yorkshire Gentlemen	"	27 28 June	356	—	198	—	
Harlequins.....	"	9 10 July	215	—	212	*184	*For 4 "
Royal Marines	Chatham	16 17 July	142	—	119	*134	*For 4 "
I. Z.	Woolwich	6 7 Aug.	161	*118	260	—	*For 3 "
Free Foresters	"	17 18 Aug.	157	136	288	—	

Batting Averages.

Names.	No of Innings.	Times not out.	Runs.	Most in a Match.	Most in an Innings.	Average.
Col. Hutchinson	6	1	187	163	100	37.2
Lieut. C. D. King	19	1	502	140	126	27.16
Capt. Wheble	20	3	337	66	45	19.14
Lieut. E. S. Cooper	12	5	134	56	39	19.1
Bombr. Barton	18	1	304	48	47	17.15
Lieut. H. R. Adair	23	2	364	69	61	17.7
Lieut. Dorehill	10	2	137	52	38	17.1
" J. Haggard	23	—	358	87	87	15.13
Major Anstruther	23	1	319	61	44	14.11
Capt. Curteis	15	1	188	52	52	13.6
Major Stephenson	7	1	70	23	19	11.4
Lieut. T. L. Coxhead	5	1	40	23	23	10.
" MacMahon	14	—	136	50	48	9.10
Lieut. Hon. Selater-Booth	8	3	48	22	16	9.3

EXTRA MATCHES.**Batting Averages.**

Names.	No. of Innings.	Times not out.	Runs.	Most in a Match.	Most in an Innings.	Average.
Lieut. C. D. King	3	1	89	49	49	44.1
Capt. Curteis	4	—	166	63	63	41.2
Major Anstruther	3	—	125	69	69	41.2
Lieut. J. Haggard	4	—	145	72	72	36.1
" Jenkinson	2	—	49	40	40	24.1
" MacMahon	4	—	54	28	28	13.2

Matches played, 5. Won, 3. Lost, 1. Drawn, 1.

LECTURES AT R.A. INSTITUTION.

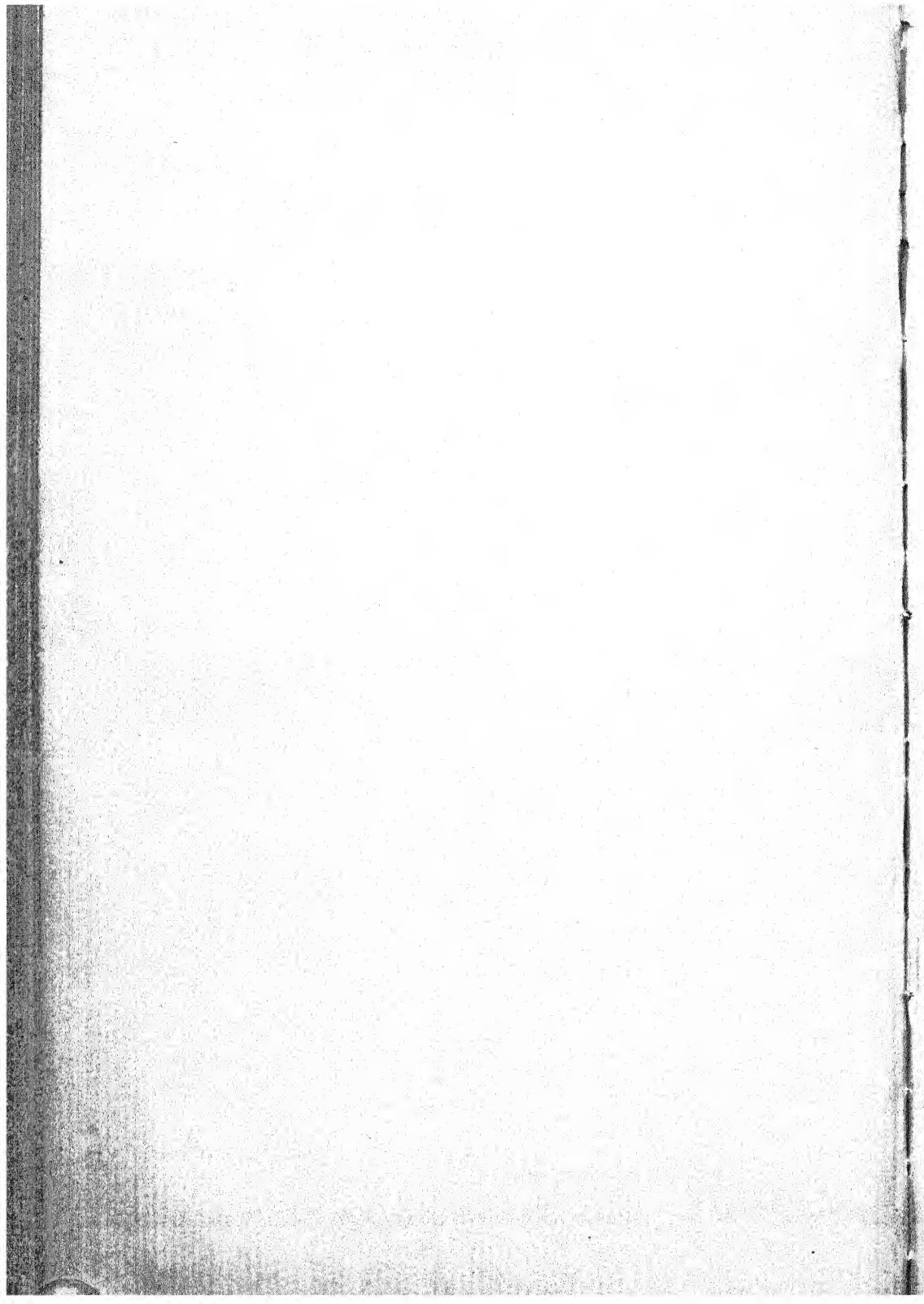
WINTER SEASON, 1888-9.

The following lectures have been arranged for on the dates as shewn below :—

Dates.	Lecturer.	Subject.
Dec. 3	CAPT. PARKIN, <i>late</i> R.A.....	Meteorology and Weather Charts.
" 10	CHARLES MARVIN, ESQ.	{ Russia's Material and Military Position in Central Asia. Physical Geography, Recent Seismic, and Volcanic Action.
Jan. 7	CAPT. PARKIN	
" 14	MAJOR WATKIN	Position Finding. (For Officers only).
" 21	COL. C. B. BRACKENBURY ...	Theatres of War in Europe.
" 28	Do.	European Armies, their Strength and Organization.
Feb. 4	Do.	{ The Strategical condition of the various European Frontiers.
" 11	DR. HODGKINSON	
Dates not fixed.	MAJOR-GENERAL STIRLING	Extempore arrangements for Coast Defence.
	MAJOR ELSDALE	Military Ballooning.
	MAJOR WHITE	Military Range-Finding.
	LIEUT.-COL. BURTON-BROWN	Applied Electricity.
	MAJOR WATKIN	Barometers and Aneroids.
	MAJOR WALFORD	Service Practice.

CORRIGENDUM.

ON p. 238, Part I. it is stated that the Brisac taken by the Germans in 1870 was the same place as that captured after a shorter resistance in 1703. This is not the case. The Brisac of 1703, taken by Vauban, was "Old" Brisac; but the two fortresses of the same name have been frequently confused in the older accounts. Hence arose the mistake.—*G.S.C.*



LAND FORTIFICATION. PAST, PRESENT AND FUTURE.

BY

MAJOR G. S. CLARKE, C.M.G., R.E.

PART II.

THE introduction of rifled arms must inevitably exercise a great influence over permanent Fortification. Theory seems to have already decided that the defence has thereby been heavily handicapped, and that heroic remedies, involving large expenditure, are required to restore the balance. The teaching of war, so far, points in precisely the opposite direction.

The increased range of modern arms has only a subordinate responsibility for the changes that have become necessary. The civil buildings of the fortified towns of the Marlborough era pressed close against the encircling lines. Projectiles from the siege batteries were not necessarily spent when they reached the ramparts, and these towns frequently suffered severe bombardments. In 1792, the Duke of Saxe threw 30,000 hot shot and 6,000 shell into Lille in 140 hours, a performance which it would be difficult to surpass to-day.¹ The 24-pr. S.B. ranged more than 3000 yards, and in 1840, when the Paris project of defence was under discussion, it was pointed out by General Noizet that the city could be bombarded from the heights of Chatillon, where 30 years afterwards the German siege batteries were actually placed. It is clear, therefore, that the destructive effect of modern fire, rather than its mere range, has expanded the zone of defence. At the same time, a growing humanitarianism tends in the direction of exacting less endurance from a civil population, and consequently imposes increased demands upon fortification.

The following table considered in connection with the relatively high remaining velocities and the improvement of fuzes² fully explains the increase of the possible effects of Artillery fire:—

¹ During the period of hottest bombardment of Strasburg in 1870, the average rate of fire was about 6,000 projectiles in 24 hours.

² "Blinds" ought now to be highly exceptional.

BURSTING CHARGES OF SHELLS.

S.B.	lb.	R.M.L., R.B.L., and B.L.	lb.
24-pr.	13 ozs.	64-pr. "	7 $\frac{1}{8}$
18-pr.	10 ozs.	40-pr. R.B.L.	2 $\frac{1}{2}$
8-in. howitzer	2 $\frac{1}{4}$ lbs.	20-pr. "	1 $\frac{1}{8}$
10-in. "	6 $\frac{1}{4}$ lbs.	8-in. R.M.L. (howitzer)	20 $\frac{3}{8}$
		15 cm. B.L. (Krupp)	5 $\frac{1}{2}$
		6-in. B.L.	9 $\frac{3}{4}$
		5-in. B.L. (steel)	7 $\frac{3}{4}$
		21 cm. mortar (Krupp)	24.2

Briefly the changed conditions which fortification, since Sebastopol, has been called upon to face *and to utilize* are due to increase in shell power, range, accuracy and penetrative effect, both of Artillery and small-arms. More recent progress, while tending to enhance the above attributes, has immensely increased the rate of small-arm fire, and has added machine and quick-firing guns.

As regards the design and general conception of land works of defence, the two most potent factors are the development of the accurate curved fire of Artillery and the great increase of the rate of fire of small-arms, including machine guns. The former is commonly assumed to have conferred preponderating advantage on the attacks, and the assumption is true so long as the older ideas of fortification remain, and the tactical conduct of the defence is neither studied nor systematized. The latter has conferred great advantages on the defence, as the experience of war has already proved even where the trammels of the past were in full force.

Railway communication which, anticipating rifled weapons by a few years only, has developed *pari passu*, constitutes a factor of a different kind, but hardly less important.

The first siege operations in which rifled Artillery played any real part took place—not inappropriately—in the New World; but meanwhile the powers of the early rifled guns were carefully tested in the mock siege of Juliers in 1860. This siege of a practicable fortress is thoroughly characteristic of the inimitable seriousness of purpose which characterizes the German mind, and the experience gained was of much importance at the moment. The result proved the superiority of the new guns for breaching purposes and showed that a detached wall completely invisible could be brought down with little difficulty by projectiles having a fall of 1 in 13. The following comparative statement¹ gives some indication of the advance in the power of Artillery:—

¹ Editorial note to paper by Lieut.-Colonel A. Ross, R.E.—Corps papers, Vol. X., 1861.

Experiments.	Range.	Total weight of projectiles fired.	Width of breach.	Weight of projectiles per linear foot of energy.
	yds.	lb.	feet.	lb.
1. <i>Woolwich, 1824.</i> —Independent inch wall 7 ft. thick between piers, 21 ft. high. }	500	660,100	100	6,601
2. <i>Juliers, 1860.</i> —Independent counterarched brick wall 3 ft. thick between piers, 16 ft. high. }	640	3,588	32	111

The experiences of the American war are full of interest and have perhaps received insufficient study. Never before was so much originality displayed during a period of hostilities, and Europe owes much to the ingenuity evolved at this time of dire national necessity. The authorship has not in all cases been adequately acknowledged, and we have since re-invented some of the commonplaces of the transatlantic operations.¹ While the direct teaching in relation to permanent fortification is inevitably small, the indirect teaching is entirely confirmatory of previous and subsequent experience.

Fort Pulaski on Cockspur Island was one of the few permanent works which came into conflict with the early rifled siege guns. The work was built of brick with one tier of guns in casemates and another *en barbette*. In addition to nature's liberal provision in the matter of water, there was a large wet ditch, doubtless intended to prevent the fort from being "captured with a rush by a landing party." "The probability of reducing it by the fire of ships was not even discussed;"² and the work surrendered on the 11th April, 1862, after a bombardment of 5275 rounds from 36 guns, of which 10 were rifled, the heaviest being an 84-pr. The fort was ruined and a breach was effected at 1700 yards, the siege guns being served by the Rhode Island volunteers, who had been drilled but "never practised in firing."

Into the cases of Forts Henry and Donelson, captured by General Grant in 1862, questions of land fortification scarcely enter. Fort Henry on the Tennessee was severely bombarded by Commodore Foote with seven gunboats on the 6th April, and surrendered at discretion to the land forces with a garrison of 60 men. "The rest of the garrison had been stationed in the outworks, about two miles off, to avoid the fire of the gunboats; and before the fight began, Tilghman sent them orders to retreat upon Fort Donelson, which they obeyed."³

Fort Donelson, on the Cumberland, was engaged on the 14th April, 1862, by Foote, with six gunboats which were "so disabled as to be unfit to take any part of importance in the succeeding operations."

¹ *e.g.* The gas-check before which fell the barbarous system of studs.

² Report on siege of Charleston.—*General Gillmore*.

³ *Badeau's life of Grant*.

On the 15th, the Confederate garrison made an unsuccessful attempt to break through the investing force, which numbered 27,000 men. Donelson surrendered on the following day after a unique council of war, at which the command was successively handed over from Floyd to Buckner and from Buckner to Pillow.

Fort Wagner on Morris Island was a provisional work constructed in sand with one bastioned front about 300 yds. long, parapets 16 feet thick and bombproofs capable of sheltering at least 1500 men. The attacking force had to be landed in the vicinity. Assaults were delivered on the 11th and 18th July, 1863, which were completely defeated, the Confederates remaining in their extemporized bombproofs to the last, and then manning the parapet and delivering a hot rifle fire. At the time of these assaults, there were no obstacles whatever; but land torpedoes were subsequently placed 200 yards in advance of the work. A regular siege was then carried on, 45 guns, of which 13 were rifled Parrott's (100-prs., 200-prs., and one 300-pr.¹), being placed in battery at ranges of from 820 to 1900 yards. In all, 1173 projectiles, 100-pr. and upwards, struck the bombproof, which was not however opened out, and the effect on the sand parapets generally was very small. High angle fire was employed in these operations, an 8-in. rifled gun, which ultimately burst, being fired at 30° 30' "constant elevation." On account of the narrow front over which the besiegers were compelled to operate, the siege batteries fired over each other; but "no such demoralizing effect on the troops in the advance was experienced as had been anticipated by some,"² notwithstanding that prematures with this virtually experimental ordnance were unpleasantly frequent. In the final bombardment which began on the 5th Sept. and lasted 42 hours, the New Ironsides "with remarkable regularity and precision kept up an almost incessant stream of 11-in. shells." The Artillery of the defence was almost useless with the exception of the two mortars (8-inch and 10-inch S.B.) which "when earnestly served caused the most serious delay in the progress of our work, and on one occasion suspended it entirely."³ Fort Wagner surrendered on the 7th September after a good resistance of 58 days. The difficulties of the siege, which were considerable, were overcome with a skill and readiness of resource which the most highly trained force in Europe could not have excelled.

Vicksburg was defended by a chain of simple field works between seven and eight miles long. A line of rough rifle trench connected the works which were irregular in trace and closed at the gorge in one case only. Vicksburg, which like Kars in 1877 held a defeated army,

¹ The heaviest gun ever taken into the trenches. The shell carried a bursting charge of 17 lbs.

² General Gillmore.

³ General Gillmore. Similar testimony is forthcoming in the case of a single 8-inch mortar at York Town. In the battle of Petersburg Mine, ten 10-inch mortars at 800 yards completely silenced a Confederate battery, directly the range was obtained. At Petersburg, also, a 13-inch mortar was fired off a railway platform truck with great effect. The garrison of Fort Issy in 1870 feared the fire of battery No. 23, mounting four 50-pr. S.B. mortars, more than anything else. (*Hayde & Froese*).

was ineffectively bombarded in June, 1862, by Farragut's fleet in the Mississippi. It was then assaulted on the land side by Sherman on the 29th December, 1862, and by Grant on the 19th and 21st May, 1863, in the latter case, after a heavy bombardment by land and river, lasting till 11 a.m. All the assaults were repulsed with heavy loss. In the second, a few works were captured but could not be held, and the greater part of the attacking force never reached the lines. In the third, the distance to be crossed under fire varied between 80 yards in the case of Ransom's and Giles Smith's commands, and 400 yards in the case of Steele's troops. On this day, Pemberton had about 18,500 men in his lines and lost about 800. Grant had about 30,000 men engaged, and his force was almost exactly decimated.

A regular siege was begun on the 23rd of May, and mining was attempted on a small scale and without success. The besiegers had 220 guns (mainly field guns) in position; but the Confederates scarcely used Artillery fire at all and made little attempt to hinder the trench work. By the 1st July the approaches reached the ditches of some of the works. On the 4th, Pemberton, who had run short of both food and ammunition surrendered after a memorable defence of 213 days.

Fort Fisher, a temporary sand work with guns all mounted *en barbette*, but possessing good bombproof cover, suffered probably the heaviest bombardment on record. On the 24th December, 1864, Admiral Porter shelled the work with 33 vessels, the average rate of fire being 115 projectiles per minute. The guns were "temporarily silenced, it being indeed impossible for anything human to stand under the torrent of missiles falling into and bursting over the work."¹ On the 25th, the fire of the ships reopened and was continued for seven hours, the fort replying slowly. The Federals then landed a large force and attempted to assault, "the fleet at the same time making a concentrated and tremendous enfilading fire on the curtain." The garrison, however, as soon as the fire necessarily slackened were able to man their parapets in time to repulse the attack completely. In spite of this severe hammering, "many engineers and officers report Fort Fisher . . . as substantially uninjured as a defensive position."² On the 13th January, 1865, Porter again opened "a very rapid severe fire from 44 ships" which was kept up during the night by the Monitors and "New Ironsides." On the 14th, the fire recommenced at one p.m. and was maintained "till long after dark." On the 15th, the bombardment opened at noon and was "kept up furiously all day, yet the 'Mound Battery' of the fort could not be hindered from answering most gallantly." Late in the evening a party of 2000 seamen and marines were landed and assaulted the work on the sea front; but received a severe repulse. The garrison, however, which had concentrated on the side thus threatened, was surprised and taken in reverse by an attack in force by General Terry's troops, and Fort Fisher fell after severe fighting.

The facts above recorded appear to show that the moral effect of

¹ Coast Defence.—Von Scheliha.

² General Butler.

Artillery fire is insignificant where adequate cover exists, and further that the fire of ships even under favourable conditions and in overwhelming force is quite unable to incapacitate an earthwork for Infantry defence. Fort Fisher was specially ill-qualified to resist assault; since the neighbouring forest had not been sufficiently cleared, while a sand mound provided cover for the attack within a short distance of the parapet.

Petersburg, the Confederate Sebastopol, was defended by field works mainly constructed after the arrival of the besiegers. Telegraphing on the 7th June, 1864, four days after the battle of Cold Harbour, and while the army of the Potomac was still on the north bank of the Chickahominy, General Beauregard alludes to the position as "nearly defenceless" and liable, in the event of a movement against Richmond to be "captured before it could be reinforced." On the 9th June, Gillmore with 2000 Infantry and Kautz with 1500 Cavalry were sent to attempt to capture the town. Gillmore reported the works "too strong to assault,"¹ but Kautz appears to have entered Petersburg on the south side and been then compelled to retire. On the 14th, Grant telegraphed to Washington—"Enemy shew no signs of yet having brought troops to the south side of Richmond. I will have Petersburg secured, if possible before they get there in much force." Accordingly Smith with 18,000 men, supported by Hancock with 28,000, were ordered to take the position. Smith's command attacked and carried a portion of the lines on the 15th; before Lee's reinforcements could arrive. The advantage was not followed up. Further attacks took place the 16th, 17th, and 18th, the whole of the 2nd Corps being present. The losses amounted to 6000 men, but the "only result was to force the enemy into an interior line from which he could not be dislodged." Beauregard had saved Petersburg.

A partial investment followed with occasional fighting on a small scale. Meanwhile a siege train of 46 guns (30-prs. and six 100-pr. Parrott's) with about 60 mortars had been placed in battery. A Confederate work in front of the 9th Corps was mined and blown into the air at 4.30 a.m. on the 30th June² and after a heavy bombardment Meade's troops delivered an assault experiencing some difficulty in getting clear of their own line of *abattis*. A severe fight took place in which the Northern force was completely repulsed with a loss of 4400 men and many prisoners, notwithstanding that Grant had stated—"such an opportunity of carrying fortifications I have never seen." On the 18th August the Weldon railway was siezed by Warren, thus seriously crippling the sources of supply of Richmond.

The works on both sides round Petersburg assumed vast proportions, and by the 25th of January, 1865, Grant opposed about 111,000 men to 70,000 Confederates in Petersburg and Richmond.³ On this

¹ Badeau's Life of Grant.

² The main gallery of this mine which was driven under many difficulties was 510 feet long and the charge 8000 lb. of powder. The crater formed was "150 to 200 feet long, about 60 ft. in width, and from 25 to 30 ft. in depth, presenting a serious obstacle to the passage of troops."—*Report on conduct of the war.*

³ According to Badeau; very different figures have been put forward.

day Lee attacked Fort Steadman, a small work where the opposing lines were only 150 yards apart. This work, held by a battalion of Garrison Artillery, was captured, but subsequently retaken. On the 31st March was fought the battle of Five Forks brought on by an offensive movement on the part of the Confederates. Early in the evening of the 2nd April, a fresh assault was delivered resulting in the capture of a portion of the lines together with Forts Gregg and Baldwin. The former with a mixed garrison only 300 strong made a determined resistance against overwhelming numbers; the latter was evacuated. At the same time, the two attacks made by Miles were totally repulsed. On the following day Lee abandoned Petersburg and Richmond.

The general character of the fighting round Richmond resembled that at Sebastopol and the difference which might have been expected from the substitution of somewhat raw troops for highly trained armies and rifled Artillery and small-arms for smooth-bores was not marked. The Artillery at Richmond played a far less important part than at Sebastopol. The soil was much more favourable for trench work in the former case, which conferred advantages as great on the attack as on the defence. Lee, however, had no Todleben.

The possibilities open to good earthworks were again emphasized and the *cui bono* in reference to the expensive refinements of drawing office fortification irresistibly suggests itself.

Atlanta, unlike Petersburg, had the great advantage of being carefully fortified before the Northern army arrived, and no attempt to assault the works was ever made. Sherman with about 80,000 men reached the place on the 22nd July, 1864, and on the 28th, the Confederates came out of their works and seriously attacked the investing force; but were repulsed. On the 7th August Sherman telegraphed to Grant—"We keep hammering away all the time and there is no peace inside or outside of Atlanta . . . will push forward daily by parallels and make the inside of Atlanta too hot to be endured." "Hood seemed determined to hold his forts," however, and sent out his Cavalry to cut the railway in rear of the besiegers. The siege made little way, and on the 25th August, Sherman moved the bulk of his army to the east cutting the West Point railroad. This turning movement caused the evacuation of Atlanta on the 2nd September, Hood escaping to the south.

The provisional works of Atlanta thus made a resistance of 41 days and served their purpose as forts, quite as perfectly as the most costly erections copied from Antwerp would have done.

The siege of Düppel in 1864 was a particularly easy operation; since the besiegers were in uninterrupted possession of railway communication with Holstein, and the heaviest siege guns could be brought from the eastern frontier of Prussia and placed in battery before the Danish lines within ten days.¹ The defences, on a line 3000 yards long, consisted of ten small redoubts, of which three were open to the rear. The largest work had about 14,000 square feet of terreplein.

¹ Rüstow.

The command was 15 feet ; the ditches were pallisaded and unflanked. In the gorges, were blockhouses of stereotyped pattern with earth on the roofs, standing well above the crest line, visible for miles and presenting ideal targets to the enemy's siege guns. The redoubts were connected by a rifle trench of slight profile, and a few rifle pits and picquet posts had been established in front. There was a second line of works all open to the rear. The armament, including that of Alsen, consisted of 108 guns, of which 92 were smooth-bores, together with a few mortars. The guns fired through embrasures in the redoubts.

The Prussians invested Düppel on the 12th February and opened fire on the 14th March from 54 guns of which 18 were smooth-bores. The 1st parallel was made at 1200 paces from the lines and the 3rd at 450. By the 13th April, the besiegers had 122 guns in battery, including 44 smooth-bores. After a severe bombardment on the 17th April, the main line was stormed on the morning of the 18th with a loss of 1188 out of about 16,000 men engaged, and the disorganization produced by the successful assault sufficed to prevent the second line from being held.

Evidently, therefore, the experiences of Düppel can be turned to account in the interests of theoretical storm-freedom, high revetments, colossal caponiers, intricate keeps, drawbridges, and what not. And practically this has been the case ever since ; notwithstanding that the real lesson is of another kind.

The lines of Düppel were stormed with comparative ease because there were very few Danes inside them, and under such circumstances most defences can be captured. It was quite impossible to keep men inside the works under the Prussian fire ; but they were fully manned during the night of the 17th-18th in anticipation of an assault at dawn. The hour fixed for the operation was, however, 10 a.m., and the Danish Commander, fearing a resumption of the bombardment at any moment, withdrew his garrisons, leaving only small Artillery detachments and weak Infantry picquets. Hence, in some cases, the redoubts were not garrisoned at all at the moment of attack, and in others the Prussians and the Danes arrived together, the former on a broad front by climbing the parapet, the latter through the gorge opening.

The lines of Düppel were stormed simply because they violated an elementary law of fortification dictated by copious experience of the past, specially emphasized only ten years previously at Sebastopol. The Mamelon fell on 7th June, 1855, for want of defenders. The Redan was found to be unoccupied on the same day and for the same reason. The attacks on the Mamelon and the Malakhoff in the early morning of the 18th June were defeated with heavy loss. Assaulted at noon 8th September, the Malakhoff fell, "almost without a struggle."¹

A redoubt, of whatever kind, must either provide cover for its defenders under Artillery fire ; or it must have an obstacle which will detain the enemy sufficiently long to enable the garrison, starting from their place of security to line their parapets. If it were necessary or

¹ Hanley.

desirable that the Infantry garrisons should be kept outside of and at a distance from these works, then evidently there exists a strong argument for deep ditches and for caponiers, provided always that picked men under thoroughly trustworthy N.-C.-O.'s can be spared to man them. The defence of the lines of Düppel practically received no assistance from Artillery fire, for the Danish guns were hopelessly overmatched from the first; while in their breech-loading rifle, the Prussians possessed a source of new power. The besiegers had in fact every conceivable advantage on their side. Far better works could have been made in three weeks, yet the defence lasted 65 days, thus easily beating the record of the great majority of the costly productions of the draughtman's art. The performance of the Düppel earthworks, bad as they were, compares most favourably for example with the 45 days resistance of Strasburg in 1870, even when it is fully granted that, in the latter case, the bombardment of the town somewhat hastened the surrender. The poor little redoubts defended by smooth-bores opposed to rifled guns, by muzzle-loading small-arms opposed to breech-loaders scarcely serve to support extreme views as to the real requirements of fortification.

It is customary to speak somewhat slightly of the performance of the French fortresses in the campaign of 1870-1. With a few exceptions, they are commonly assumed to have fallen to brief bombardments by field guns, becoming thus available as illustrations of the power of rifled guns over fortification generally, and indicating the necessity for armour in various forms together with other artifices dear to ingenious minds. On the other hand, the fate of these fortresses has also been regarded as attesting the inefficacy of fortification generally, the uselessness of fortresses in face of the conditions of modern war.

Political considerations determined the fatal movement to Sedan. Therefore fortresses exercise a baleful attraction over armies. Metz, a great frontier place of arms, was quite unprovided for a blockade. Therefore fortresses are now easily thus reduced. But for the fortresses, however, the Germans would have swept France clear of all organized bodies of troops within two months of the frontier battles. Had Paris and Metz possessed two months more food supply, the fortunes of the war might have been changed.

The French fortresses suffered from almost every conceivable disadvantage. Excluding the unfinished forts of Metz, the newest of the fortresses attacked—Paris—was 30 years old. The average age of the rest must have been more than 150 years! Though initially ill-found in all respects and almost as completely unprepared for war as our own defences at home, few of these fortresses were improved or strengthened in the available time after the outbreak of hostilities. Not many things are more difficult than to direct a defence, and, with few exceptions,¹ France had not the men for the work. To meet a siege train thoroughly reorganized after the Danish war and brought fully up to date, the fortresses had no armaments worthy the name. A number of men, even of disciplined troops, does not make a garrison,

¹ Notably Col. Denfert of Belfort fame.

and in most cases the closely knit and carefully organized forces which a good defence requires were not available.

Vitry, Toul, Laon, Schlettstadt, Neu Bresac, La Fère, Peronne, and Rocroy, were garrisoned almost entirely by gardes mobiles, who at Vitry had not received their uniforms, and at Schlettstadt were engaged in looting their compatriots when the Germans entered. Add to this that the fortresses were in almost every case mere lines enclosing towns in which the civil population were exposed to the full effect of bombardment, and it seems clear that prolonged defences could scarcely be expected.

Judged by past standards, however, these hapless fortresses acquitted themselves creditably.

In Appendix E a précis of the siege operations of the war¹ is given which brings to light the following facts:—

1. The total number of fortresses detailed is 24, and of these one (Bitsch) was never taken, and six (Lichtenberg, Lützelstein, Marsal, Vitry, Laon, Sedan) made practically no resistance.

2. The average duration of the defence of the remaining 17 fortresses was 41 days. Excluding Paris and Metz which held French armies, the average resistance of the remaining 15 was 33 days.

3. The Germans employed siege guns in 14 of the 18 cases in which alone any resistance was offered.

4. Formal sieges were undertaken only at Belfort and Strasburg; partial sieges at Paris, Schlettstadt, and Longwy.²

From the above, it appears that the average period of resistance of the French fortresses excluding Paris and Metz was the same as that of the fortresses which played a part in the Marlborough wars and in the Peninsula.³ Including Paris and Metz the era of rifled weapons actually shows an increase of 20 per cent. in the time-endurance of permanent fortification. Granted most freely that a mere measurement in days affords no absolute standard of comparison, the striking fact remains that in spite of every sort of disability the French fortresses pitted against guns not dreamed of when they were built acquitted themselves quite as well as the *chefs d'œuvres* of the Vauban school in the days of their glory.

This affords no proof of the fitness of theoretical fortification for the purposes of war at any period; but it unquestionably indicates that as compared with the past the defence had lost nothing under the conditions which obtained in 1870. At least the inference is inevitable that, up to this period there was nothing to cause gloomy forebodings as to the future of fortification, or to justify such a wholesale recourse to iron as has found advocates.

It is willingly admitted that, except in certain cases, the siege operations of the Franco-German war were not pressed with any great

¹ Taken from Col. von Tiedemann's work.

² In many other cases batteries were built, however, even for field guns.

³ See Part I.

vigour. Judging from the experience of Strasburg, however, there is no reason whatever to suppose that more rapid and striking results would have been secured by arduous trench work. The very reluctance of the Germans to embark on such measures, even where speedy capture was a matter of great moment, constitutes a strong proof of the existence of a belief that the siege of an obsolete fortress is no easy task.

The siege operations of the 1870-71 campaign will repay a careful study by all who wish to base fortifications on the experience of war and not on the promptings of the inner consciousness supported by diagrams. The main characteristics on the side of the attack were heavy bombardment, and an excessive reluctance to assault, even in cases where an early capture was extremely important and where the conditions were theoretically favourable. A single assault was attempted against the provisional works of Belfort and failed altogether. On the side of the defence, the Artillery was—as usual in the case of permanent fortification—nearly impotent. The effects of the fire of the attack were uniformly small except where the design of the works themselves was such as to ensure the maximum advantage to the enemy. Even on the towns, exposed as they were, the effects appear to have been moderate in many cases. In Paris, the total number of killed and wounded is given as 375,¹ and the fires which broke out seem to have been easily extinguished.

The want of casemate cover was severely felt in numerous instances. Only one case arose (Strasburg) in which mining operations might apparently have aided the defence, and of the possibilities offered, the French, unlike the Russians at Sebastopol, took no real advantage.²

Judging between attack and defence, from the experience of these and the earlier siege operations, it appears that while rifled Artillery conferred a certain advantage on the attack, the breech-loading small-arm gave a great advantage to the defence. This inference would not be a just one, however, and the relative value of modern Artillery in the attack and defence cannot be tested until more rationally conceived permanent fortifications have undergone a siege.

The operations round Paris are specially instructive, and the attack on the south side may be regarded as typical of the whole. In 1815, Blücher arrived on the heights of Issy and Vanves, and this appears to have determined the positions of the southern lines of forts, although it was pointed out by General Noizet in 1840 that Paris could be bombarded from the plateau of Chatillon with the smooth-bores of the day. An attempt was made to occupy the plateaus of Chatillon, Clamart and Meudon by provisional works; but, in the general confusion which followed the defeats on the frontier, these works could not be completed and were abandoned to the investing army.

Fort Issy (Plate I.) may be regarded as a fair type of the detached forts of Paris. The adjacent works of Vanves and Montrouge were precisely similar in conception, but were based upon a square trace.³

¹ Vinoy.

² Three mines were discovered by the Germans in front of Lunette 53, of which one was charged.

³ By which the evils of the bastioned system were aggravated. This system however found a surviving advocate, in Col. Prévost in 1872.

Issy, which must be supposed to represent the ideal of the dominant school of thought in France in 1840, thoroughly illustrates the practical outcome of pure theory. One school had desired to surround Paris with a stupendous bastioned *enceinte* wandering over hill and dale, ignoring topography and the elementary principles of tactics alike. This scheme, however, appearing either too evidently preposterous, or more probably too expensive for practical realization, the detached forts won the day. The result is a curious study. Deprived of half the fascinating possibilities of the Vauban era, the French engineers appear to have conceived nothing more original than to take a purely geometrical form and apply a bastioned trace to it, adding as many rudimentary organs as possible. Thus the tennaille reappears; but covers only a limited portion of the curtain wall of the scarp (*see* Section I K). The lost ravelin was permanently represented by the excrescence in the covered way and provisionally reproduced in the palisade enclosure X.¹ Even the so-called "*redoubt* of the covered way" has its expression. The work is treated similarly on all the faces, otherwise the symmetry and the general appearance of the designs would have been marred; yet it is not easy to understand how Fort Issy could have been attacked by an enemy occupying a position between it and the *enceinte* of Paris. The elaboration accorded to the rear faces was scarcely needed as a protection against parties of Infantry which might have succeeded in passing between adjacent works, and even smooth-bore field guns once established in rear could have trundled their round shot right into the dwelling casemates. The revetments were hopelessly exposed, and a siege train of the type employed by Lord Wellington in 1812 at Ciudad Rodrigo 38 years before Fort Issy was built, would have breached them with ease. In 1824, important experiments had been carried out at Woolwich with S.B. howitzers, and cannonades fired at elevations of 10° to 21° by which a screened wall was successfully breached.

To build revetments thus exposed in 1840 was therefore doubly inexcusable. The teaching of the past had in fact been all forgotten in the fascinations of mere tricks of trace and detail. The result was a costly work, mounting 60 guns which may have flanked everything flankable, but were utterly unable to cope with siege batteries on which a mere fraction of them could be brought to bear. Further, the work exposed long faces to enfilade fire,² very few traverses having been provided.³ Rather more than three-fifths of the whole of the enclosing rampart was taken in reverse! Such were the conditions created by a subordination of the experience of war to mere geometry.

Immediately after the Danish campaign the Germans had adopted the high carriage, and it was against siege guns thus mounted that the ordnance of the forts firing through narrow embrasures dating back

¹ This appears to be better suited to the purposes of a village pound than those of fortification.

² The flanks being so short two whole fronts were practically liable to be enfiladed each by a single siege battery. The rear faces were practically breached by reverse fire.

³ Traverses were subsequently added as shown in Plate I. Among curious relics of the past is the mode of palisading the covered way. (*See* Section I K.) The futility of this measure had been pointed out in von Moltke's account of the Russo-Turkish war of 1828-9.

for more than 200 years and condemned by Morla in 1796, were forced to contend. Thus arose the obvious anomaly that artillery brought hundreds of miles in winter and placed in rough batteries built in the field was not only better protected, but secured a far wider field of action than guns mounted in costly forts built with all deliberation in time of peace. Under such conditions, it is easy to understand that the silencing of the forts was a matter of no great difficulty and that the "annex batteries" and the works built after the investment alone gave any real trouble to the attack.¹ The "Park Battery" of Issy, for example, was found particularly difficult to hit, and everywhere guns fortunate enough to be posted *outside* of the expensive positions specially built for their accomodation, enjoyed comparative immunity.

The guns of the defence posted haphazard and served by men in no sense organized for the duty were evidently unfit to compete on equal terms with a well appointed siege train, and the want of any clear ideas as to how fortress Artillery should be handled combined with the very indifferent shooting of the French gunners serves to explain the fact that for about 60,000 rounds fired on the south front, the German loss was 50 killed and 281 wounded, an average of 181 rounds to each man hit.

On the other hand, in spite of many advantages, the Artillery of the attack developed little man-killing power. Vinoy gives the following as the average daily loss of the forts named and their satellite works during the 22 days bombardment, viz:—

Fort Issy	...	...	...	...	...	8
" Vanves	...	...	...	...	...	5
" Montrouge	...	...	...	...	...	8 ²

The summary of damage caused to these works (Appendix F.) serves to illustrate well the difference between siege operations and target practice.

If the results due either to initial errors of fortification or merely to the superannuation of the forts are subtracted, and if a further corection is made on account of the bad mounting and equally bad handling³ of the French guns, it will be evident that works well conceived and well fought have extremely little to fear in an Artillery contest.

In spite of numerous defects, the Paris defences built before the revolution in Artillery won an exceptional triumph for fortification. They answered their purpose in 1870–71, as well as they would have done 30 years previously. Nor can there be much doubt that works

¹ One mortar battery behind the railway embankment between Forts Issy and Vanves could not be silenced at all, and the "annex batteries" of Vanves and Montrouge were never more than temporarily held in check. *Belagerung von Paris.—Heyde u Froese.*

² Admiral de la Roncière gives the total loss in Montrouge as 29 killed and 187 wounded.

³ There was "an inexcusable waste of ammunition, apparently according to no prearranged plan and without skilful supervision." "The Garrison Artillery paid not the slightest attention to watching their fire for the purpose of fixing its elevation and direction; similarly they appeared to profit but little by the great advantage they had on their side of being able to ascertain the distances accurately."—*Col. von Tiedemann.*

could have been executed at about one-fifth the cost, which would have given even better results.

No teaching in regard to assaults is to be gained from Paris. Advantageous as it would have been to the Germans to occupy the line of the southern forts which lay only 2000 yards from the *enceinte*, no regular attempt was ever made to breach the exposed revetments. The French works were well supplied with obstacles; but the amount of "undefended ground" represented by the profusion of quarries in front, was calculated to unhinge any well regulated mind.¹

In strong contrast to the costly permanent works of Paris is the Hautes Bruyères redoubt (Plate II.), an advanced work on the south east of Fort Bicêtre. This work, copied from a German design, was begun about the 4th of September² and not completed till some time after the investment. It provided safe bombproof cover for 500 men crowded, and when surrendered at the capitulation had an intact armament of 13 guns and 2 mortars. One bombproof only shewed signs of injury. The embrasures had all been repaired and the work generally had received little or no damage.

A continuous *enceinte* of old type was regularly besieged at Strasburg only. The covered way was crowned in due form, descents into the ditch were made, a bridge of casks was built leading to one of the advanced lunettes. Orthodox breaches were effected, and altogether the operations resembled those of the preceding century—even to the surrender previous to the assault. The Artillery of the defence was hopelessly overpowered, and of the total German loss of 866, only 389 casualties were due to Artillery fire.³ The defenders had 92 guns dismounted; but the mortars of which little use was made remained uninjured. The breach in Bastion 11 could have been defended with little difficulty, and the works generally were still defensible when surrendered. The fall of the fortress was doubtless accelerated by the heavy bombardment of the town and the insufficiency of case-mate cover for the garrison in the vicinity of their lines. Notwithstanding all disadvantages however, Strasburg, judged by the standard of the past, made a good defence.

The siege of Belfort presents some special points of interest. Belfort possessed the almost unique advantage of a commandant who understood the nature of the task which devolved upon him. Moreover Col. Denfert not being invested till the 3rd November had a long period for preparation which he was well qualified to utilize. Outside an *enceinte* of most elaborate description⁴ there were on the north-east side two permanent Forts la Miotte and la Justice designed by Haxo; and on the west, a large work of recent construction—des Barres. The

¹ An interesting pre-historic monument in front of the Cottonera Lines at Valetta, has been lost to the archaeologist for ever. These few stones might possibly have sheltered four or five men, but in accordance with the high standard of preparation for war maintained in our works of defence, their removal was necessarily a matter of urgency.

² Geldern.

³ Von Brünner.

⁴ Principally Vauban's 3rd and worst system. (See Figure, page 236, Part I.)

south side, which was chosen for the attack, was closed by two provisional redoubts—Haute Perche, Basse Perche (Plate III.,) and one mere field work Bellevue (Plate III.,) the respective intervals being 700 and 1700 paces, and the distance from the *enceinte* 1200 paces. The villages of Daujoutin and Bavilliers, about 1500 paces in advance of this line, were held by the French; but, probably on account of the great amount of other necessary work, were not placed in a satisfactory state of defence. Bavilliers which was weakly occupied was surprised by a night attack; but Daujoutin repulsed the first attack on the night of the 14th–15th December, and was only captured on the night of the 8th–9th January after a siege gun bombardment. A systematic attack was then directed against the Perches redoubts, supported by a siege train of 268 guns and mortars of which 96 (including 40 long 24-prs.) directed their fire on the Perches and Bellevue, armed each with eight to ten field guns only. The defenders, however, handled their Artillery with remarkable vigour, frequently moving their guns and employing high-angle fire against the siege works. “There were many pressing reasons”¹ for ending the siege, and an assault on the Perches took place on the evening of the 26th January. The right column attacking Haute Perche had the advantage of ground which “screened it from the defenders view during the greater portion of the advance; but beyond this point it was checked by the heavy fire of the enemy.”² The men of the left column directed on Basse Perche (Plate II.) succeeded in descending into the ditch where they were caught by French reserves and nearly all captured or killed.

“The assault, therefore, completely failed,” and the saps were pressed on to the ditches. On the 8th February the Haute Perche was surprised by the Germans who found only a guard of 10 men ensconced in the gorge bombproof. The Basse Perche was captured almost at the same moment and offered a slight resistance. The heights thus occupied were rapidly turned into a formidable Artillery position for 60 guns, and the *enceinte* and citadel did not await the opening of fire. Belfort, on the front attacked, thus presents the case of a stupendous *enceinte* protected by provisional works. The latter answered their purpose remarkably well, the former *quâd enceinte*, proved absolutely worthless, as soon as the provisional works had fallen. The design of the Perches redoubts possesses no merit of any kind; but the steep rock-cut ditches proved an efficient obstacle. The trace is only interesting from the Darwinian point of view, the little one-gun projections in the flanks being specially remarkable.

While, however, Belfort made a good defence, it must not be forgotten that the difficulties of the besiegers were great. Their position was threatened by Bourbaki's army till after the fight on the Lisaine. The ground was rocky and frozen, which made the siege works hard to carry out. Much sickness appeared among the troops.

¹ Col. von Tiedemann.

² Col. von Tiedemann. This repulse has been attributed to a rough entanglement formed between the stumps of the trees cut down.—(Geldern). There were no other obstacles.

Per contra the nature and state of the ground was equally disadvantageous to the defence, and it should be remembered that the commandant was called upon on the 3rd December to deal with a partial insurrection in the city.

The teaching of the siege operations of the 1870-71 campaign may be briefly summed as follows:—

1. The introduction of rifled weapons has led to no diminution of the resisting power even of fortresses designed to oppose smooth-bores.

2. The real successes of the siege Artillery were obtained against civil buildings, and properly designed works have little to fear from its effects. In most cases smooth-bore guns would have been able to deliver an equal number of projectiles into the towns, and the greater effect, if any, of the modern weapons was due to increased shell power and accuracy, not to range.

3. The older methods of mounting fortress guns are hopelessly obsolete—a fact which the adoption of the high siege carriage by the Germans in 1865 might have rendered sufficiently evident.

4. The handling of the Artillery of the defence was almost uniformly faulty, and no satisfactory conception of its powers can be formed until the proper employment of this Arm is understood, and the organization necessary for the full development of its action has been applied in war.

5. The French fortresses were, almost without exception, defended by the rifle alone.

6. The siege of Paris serves, as pointed out in 1874,¹ to kill recruits.

7. None of the superfluous technicalities with which the heads of cadets are uselessly crammed and by which an erroneous conception of fortification is impressed upon them, perhaps for life, proved to have the smallest value.

8. Within broad limits, the nature of the works of a fortress is subordinate to tactical conditions and the conduct of a defence, the degree of preparation for war and other matters effectually obscured by the fog in which theory has enveloped the science of fortification, will mainly rule the issue of the siege operations of the future.

9. The low command and comparative invisibility of the works constructed at Paris after the investment gave them great advantages over the permanent forts.²

Plevna, when Osman Pasha's advanced guard from Widdin arrived there about the 16th July, 1877, was an open Bulgarian village lying in a hollow with rolling hills around it. Nicopolis having been taken

¹ *Belagerung von Paris. Heyde u Froese.* No such happy result has followed, however—*vide* "*La Fortification du Temps present.*"

² Von Tiedemann mentions the attempt made to conceal the siege batteries before Longwy. "A peculiar method of construction was adopted to obtain more cover and to reduce the chances of discovery, and this consisted in making the flanks with gentle slopes which could scarcely be discovered at a distance." Similar measures were, however, adopted at the siege of Fort Wagner where "great care was taken not to disturb any of the natural features of the landscape." (Gillmore).

on the 14th, Schilder-Schuldner with between 8000 and 9000 men, and 46 guns, was ordered to occupy Plevna, then defended by a few trenches only. The position was attacked on the 20th, and part of the force reached the outskirts of the village, to be completely defeated with a loss of about 2900—more than one third of its strength. From this day the strength of the place steadily grew, and when attacked on the 30th July by Krudener and Schackoffskoi with about 30,000 men and 176 guns, the defences were by no means to be despised. The defeat of this second assault with a loss of about 7,300—one-fourth of the attacking force—changed for the time the whole aspect of the campaign and rendered the position of the Russian army temporarily precarious. The Roumanian contingent having been brought across the Danube and Russian reinforcements having arrived; the total force before Plevna reached a strength of about 75,000 Infantry with 9,500 Cavalry, 364 field guns, and 24 siege guns. On the 11th September a general assault was delivered, preceded by a three days bombardment. The attack was repulsed with a loss of about 17,500, amounting to 31 per cent. of the troops engaged, and 23 per cent. of the total strength before Plevna. No. 1 Grivitzza redoubt alone remained in the hands of the allies. On the 18th July, the Roumanians made an attempt on No. 2 Grivitzza redoubt, which was repulsed with a loss of about 400. On the 28th September, Todleben arrived and a systematic investment was resolved upon. By the 24th October the communications of Plevna were completely cut and the capture of Telische by Gourko on the 28th swept away the last Turkish force on the Plevna-Orchanié line and enabled the Russians to close in upon Plevna on the west side. On the 16th November, Gourko started for Orchanié, and the investing force remaining before Plevna consisted of 5,000 Cavalry, 107,000 Infantry, 40 siege guns, and 510 field guns.¹ During the investment the Roumanians carried on a systematic attack (Plate V.) against No. 2 Grivitzza redoubt, and on the 19th October delivered two assaults, their trenches being then within about 30 yards of the ditch. The assaults were repulsed with a loss of over 900 men.

On the Green Hills, Skobelev seized and entrenched a position within a short distance of the Turkish works. With the above exceptions, the operations were limited to a close blockade varied only by occasional Artillery fire upon the Turkish works. The Russians entrenched themselves strongly round the place and awaited the end.

On the 10th December, Osman Pasha, whose resources of food and ammunition were nearly exhausted, made a gallant but hopeless attempt to cut his way out to the west, and Plevna fell after a resistance of 142 days.

Thus, like Sebastopol, Plevna grew into a fortress under the eyes of the besieging force; but the two cases present numerous points of difference. At Sebastopol, the line held by the Russians, about miles, was very short in comparison with their strength. The resources of the defenders were enormous, and in the number of their guns they

¹ Todleben.

always possessed a superiority. On the other hand, the besiegers brought up an immense siege train as compared with the 40 siege guns employed at Plevna. From the first bombardment of the 17th October, 1854, the combatants were always face to face and no such withdrawal of the besiegers took place as occurred at Plevna after the failure of the attack of the 30th July. Again, the communications of Sebastopol, although practically inferior to those of the allies, remained open till the last. Plevna was isolated after the 24th October. The soil round Plevna was extremely favourable to trench work on both sides. At Sebastopol, as at Kars, the natural difficulties were great.

Thus, although the conduct of the operations and the results from the point of view of fortification bore strong points of resemblance, no direct comparison is possible. We, sitting here at home, can demonstrate to our own satisfaction how easily Sebastopol and Plevna might have been taken under arrangements which we are ready to detail; but the fact remains that, under very different conditions, these two extemporized fortresses served the general purpose of fortification, as the costly ideals held up for the perversion of our aims have almost uniformly failed to do.

There was no magic about the Plevna redoubts, and no special excellence of design; but the Turks, probably because they were not hampered by theoretical considerations, grasped and applied some great principles, winning corresponding advantages. Plate IV. shews No. 2 Grivitza redoubt, which may be regarded as fairly typical. The existence of this little work was not known at the time of the great assault because it was effectually masked by maize, which ought to have been cut down so as to give a free field of fire for whatever number of yards the text books may lay down. The result of this neglect to "clear the foreground" was that the 3rd Roumanian Division, told off to assault No. 1 redoubt from the north, after making its way with difficulty up a steep slope covered with brushwood, came unexpectedly upon No. 2, and were repulsed with heavy loss. Further, the capture of No. 1 redoubt, the so-called key of the position at an immense sacrifice of life, proved practically valueless.

Against the little No. 2 Grivitza redoubt on a square of 46 yards side and commanded at 300 yards by No. 1 redoubt, an elaborate formal attack was carried on (Plate V.), ending in the establishment of mines under the parapet. These operations may appear at first sight necessarily superfluous; but that similar instances are recorded even before the era of the breech-loading rifle. At Cassel in 1762, a little earthwork was regularly besieged, and at Colberg in 1807 a small detached field redoubt made a resistance of 44 days. In 1870, the Perches redoubts at Belfort were honoured by systematic approach.

The Plevna works are easy to criticize. The square trace almost universally adopted gives large "dead angles." "Undefended space," existed to a surprising extent. The relative traces of adjacent works were often guiltless of any mutually flanking purpose. One important group of works was completely commanded by a ridge which appears to tower over it. The ditches had no flank defence of any kind. "Every (provisional) fort should be provided with a keep" says one

of our text books.¹ No work at Plevna had anything of the sort ; nor was there room for it. While, however, in these and other respects, the Plevna defences were lamentably deficient, the Turks appear to have fully realized certain principles of far greater importance in war.

Plevna was to be defended with the rifle mainly, and scope must therefore be allowed for its use.² A long line of defence had to be held. Closed redoubts on the tactical points, supplemented by numerous light trenches on front and flanks met the case, providing for a great development of rifle fire ; while, at the same time, the temporary loss of portions of these trenches mattered little. The Russians had an immense superiority in Artillery, and would be able to render the manning of the redoubts scarcely practicable under fire. The garrisons must therefore be close at hand and able to occupy their stations at short notice. This was met, not only by liberally providing cover in the works themselves (*see* Plate IV.), but by siting them in some cases so that the ground fell immediately in rear, thus greatly facilitating the protection of the reserves. This tendency to draw back the works from the positions in which we are accustomed to place them was based on a correct instinct. With an excellent breech-loader and plenty of ammunition, the distance required to repulse an assault is comparatively short. The principal defect of the Plevna defences was the complete absence of all obstacles, for the construction of which there was no suitable material at hand. The sides of the ditches stood at steep slopes ; but the degradation of the parapet under the heavy Artillery fire to which the works were subjected somewhat facilitated assault. The addition of good obstacles would not only have saved No. 1 Grivitza redoubt from capture ; but may fairly be set off against the tactical errors committed by the Russians.

Plevna like Sebastopol supplies no argument against permanent works built in peace time ; but, in common with all the experience of war, it distinctly proves that the fortification which has been arrived at in defiance of the law of the survival of the fittest³ may be safely relegated to the domain of abstract speculation.

While Tewfik's extemporized place of arms was holding the Russians completely at bay in Bulgaria, the far more ambitious fortress of Kars fell into their hands for the third time. Kars, taken in three days in 1828, was only starved into surrender in 1855 after a splendid resistance of five months, having previously inflicted crushing losses on the besiegers. Permanent defences having been added, the fortress was stormed on the night of the 17th-18th November, 1877, with a loss of

¹ Written some time after the siege of Paris, which in the opinion of other authorities (Heyde and Froese) sufficed to kill the reduct.

² In an elaborate design for a large permanent fort, the cost of which would be about £60,000, the two front faces have 42 yards of Infantry parapet and there is no covered way. The front face of No. 1 Grivitza redoubt provided 32 yards and the covered way 85 yards more. As regards frontal development of rifle fire at long range, therefore, the little work thrown up in the field far surpassed the costly permanent fort. At close quarters, the advantage would be only 4 to 3 in favour of the latter.

³ The evolution of fortification appears to have proceeded under an arbitrary and artificial selection akin to that which has given to us the pug dog and the lop-eared rabbit.

2,273 all told, having made a resistance of about 30 days. On the 15th October, Moukhtar Pasha's army had been utterly routed on the Aladja Dagħ "nearly half of it being destroyed."¹ Moukhtar himself reached Kars during the night of the 15th-16th October "in the midst of the disorganized panic stricken fugitives." "Taking 2800 men who were in a reasonable state of organization," he abandoned Kars to its fate. The fortress had 12 detached forts and a citadel, nearly all built since the Crimean War. The weight of the assault fell upon the works in the plain to the south-east of the town—Hafiz, Kanly, and Souvari. Hafiz was a square redoubt on a side of 400 yards with bastions at the angles, traversed parapet, ditch 12 feet broad and 6 feet deep, and a three-storied casemated barrack at the gorge. Kanly consisted of two square redoubts on a side of 150 yards, with a lunette in rear, having bastioned faces and a two-storied casemated barrack closing the gorge. Souvari was a simple lunette and, like several of the remaining works, without any ditch. The works generally had no secure casemate cover and no water supply; Hafiz and Kanly alone had traverses, and earth for repairs was not available.

Kars was invested shortly after the battle on the Aladja Dagħ, and a bombardment from 48 siege guns was opened on the 11th November. The results appearing to be small, it was determined to assault, and a moonlight night was chosen in order to surprise the garrison, and at the same time avoid the ample chances of disaster, which operations undertaken in the dark necessarily involve. The Turks appear to have been entirely unaware of impending danger. Fort Souvari was completely surprised, and captured without firing a shot. The two columns of 10 battalions told off to attack Fort Kanly were checked under fire by some *trous de loup* in front. The eastern redoubt was however stormed and the western redoubt turned without much difficulty; but the work in rear offered considerable resistance. The reserves were brought up and both flanks were turned, a portion of the garrison still holding out in the casemated barrack till threatened with dynamite. In front of Fort Hafiz also the attacking force of five battalions was discovered before it could close, and about 2500 men swerved to the right to attack some trenches on the Karadagħ. Hafiz was ultimately assaulted in front simultaneously with a flank attack from Fort Kanly, and was carried. The Turks endeavoured to shelter themselves behind the casemated barrack which had been ruined by the Russian Artillery fire, but were caught, and "annihilated."² Fort Karadagħ was an earth bank laid out on the bare rock with a bastioned trace in front. There were neither ditches nor traverses, and the barracks with which the gorge was to have been closed were unfinished. There was however an interior cavalier forming a sort of keep. The Russian force diverted from the attack on Fort Hafiz succeeded in entering Fort Karadagħ and followed the Turks into their interior work: The loss of the four forts above

¹ "Russian army and its campaigns.—Greene.

² Report of Grand Duke Michael.

named sufficed to procure the surrender of the citadel and all the works on the left bank of the Kars River.

While, however, the Russians achieved an almost unbroken success on the right bank, the assault of Fort Tchim and an unpremeditated attack on Fort Tekmass resulted in complete failure. Fort Tchim the next work to Souvari on the other side of the river, a mere lunette with a closed gorge, but without ditches or traverses, was attacked in rear and completely surprised by the three battalions who had captured Souvari; but the Russians were repulsed. A little later an independent attack was delivered in front by one battalion which did not even succeed in reaching the work. Fort Tekmass, a weak edition of Fort Kanly, having no outworks or casemate barracks, was attacked by three battalions, who were so much cut up as to be "practically of no more use during the night."

Kars in 1877 clearly made a poor defence, although the respective strength of the garrison and of the attacking force was curiously similar to that of the combatants of 1855. Though faulty in many respects, the defences in 1877 were of a much higher technical order than Colonel Lake's works mainly built of piled up stones collected after the arrival of the besiegers. Moreover, cholera had not appeared in Hussein Pasha's camp. There is little to learn from the third siege of Kars which, however, furnishes further proof of the small influence of the so-called technical qualities of fortification in comparison with general tactical conditions. You cannot make an indifferent and badly handled force safe with all your money and art. Given a sufficiency of supplies and ammunition, almost any rationally conceived fortifications are sufficient for the purposes of steady troops ably commanded.

The barrack in the gorge of Fort Kanly which appears to have accidentally escaped destruction by the Russian Artillery fire, to which it was fully exposed, has proved a perfect godsend to the advocates of keeps, reduits, citadels, &c. General Brialmont¹ welcomes this "*exemple remarquable de l'utilité des reduits*" as a support to an excessively thin argument in which the entire question is begged at an intermediate stage by the assumption that keeps "double the moral force of the garrison" and allow its strength to be diminished. The case of Fort Kanly simply goes to show that, if a redoubt presents no obstacle whatever to assault and can in addition be turned without difficulty, an intact loopholed building will afford a temporary refuge to such of the defenders as can manage to escape into it—more than 500 Turks were killed in the outside work. This must have been a sufficiently evident proposition at all periods; but the further step—the acceptance of the reduit proposed by General Brialmont, which is inside a deep and over-flanked ditch, and which moreover would be practically valueless if the real line of defence had fallen—does not precisely follow therefrom.

The works constructed in England after 1859 were specially favoured by circumstances, as was pointed out by Lieut.-Colonel (now Lieut.-General) Gallwey, R. E.—"We as a nation may consider ourselves "fortunate that the defence of our principal ports has been postponed "to the present time." With few exceptions, these works were

¹ *La fortification du temps present.*

constructed after rifled ordnance had unmistakably proved its powers. The evidence given before the Royal Commission which reported on the 7th February, 1860, is conclusive on this point and the certain supersession of S.B guns was thoroughly recognized by all the most competent witnesses. Thus, Captain Hewlett, R.N., stated:—"I need not say how important it is that Armstrong's guns should be substituted as soon as possible for the common ones in the defence of our arsenals." General Sir J. Burgoyne, I.G.F., spoke of "five mile weapons," and added "not only Armstrong's but any rifled gun will do the same thing." Sir W. Armstrong testified—"the extreme range I have reached is 9175 yards, at a distance of 8000 yards, I think that an object occupying an area of ground 100 yards by 50 yards width would receive about one-third of the shells fired at it from land batteries," and he further expressed the opinion that "it would be very unsafe to presume that guns of equal power may not be brought against us during the next two or three years." As regards high-angle fire, Sir W. Armstrong was equally clear that rifled ordnance would entirely supersede mortars, and he informed the Committee that he had obtained the "greatest results at 35°, significantly remarking—"that you can strike a wall . . . firing with low charges at a rapidly descending angle, is certain." Similarly, the Committee, of which H.R.H. the Duke of Cambridge was president, reported on the 22nd February, 1859, that the guns of the day "even at their present ranges (and there is every prospect of their being further increased) will require that an enemy be kept at a distance of 9000 yards."¹ The conditions under which the greater part of the defences of England and of the four Imperial fortresses abroad were constructed, were thus far more favourable than those which faced the designers of the Paris forts of 1840. A revolution in arms had already taken place, and the best minds of the day had fully grasped its portents. A further advantage existed, however, in the rich experience which had been gained at such heavy cost in the Crimea and which had made a profound impression on all the best minds of the day. A detailed examination of the designs of the works in question with a view to ascertain how far they conformed to the conditions of the day, and how far mere theory was permitted to over-ride the teaching of war, though specially instructive from the present stand point, would be manifestly inexpedient. The works are large, elaborate and costly. The bastioned trace to which the French Engineers had clung with so much wasted affection was happily superseded; its place being taken by caponiers, occasionally of monumental proportions. The single line of fire of the flank was replaced by two or three tiers in the caponiers. The high scarps with the disadvantages subsequently demonstrated were retained; notwithstanding that Sir W. Armstrong's evidence, taken in conjunction with the results obtained in the experiments carried out with S.B.

¹ Obviously, therefore, any notion that the danger of long range bombardment to fortresses is the direct result of the new type guns recently introduced is entirely fallacious. The danger existed and was completely foreseen 28 years ago.

ordnance at Woolwich 16 years previously, and with light rifled guns at Juliers in 1860 supplied a strong argument for the Carnot wall. Theory appears to have determined that the latter provided special facilities for escalade—a mere delusion which experiment would have dispelled.¹ The result was in some cases a revetment barely able to sustain its normal load. The principal characteristics of these works are large size, high command, broad and deep ditches, tall caponiers. The trace is fairly simple, the interior arrangements are sometimes complicated. There are keeps in some cases, and two-storied casemate barracks are to be found. Unlike the Paris forts of 1840 the gorges are specially treated. It was considered that only Infantry would be able to penetrate between adjacent works, and thus concurrently with a gorge provided with a deep ditch, a three-storied caponier and a drawbridge may be found a main magazine offering a 3-ft. 6-in. vertical wall to any projectile arriving with a fall of two or three degrees. The dwelling casemates also are similarly exposed, and it is clear therefore that the works were regarded as unassailable in rear by Artillery fire, or by long range Infantry fire, even in the absence of an *enceinte*. Taken as a whole, the guiding principle of these works seems to have been to provide large enclosures secure against assault—so long as they were not subjected to the fire of siege guns. As fighting positions many of these forts cannot be either described or criticised, since as regards the essentials of such positions, judged by the experience of Sebastopol, they remain to be completed. The measure of security against assault—not preceded by a siege train attack—reaches the highest standard which the most exacting theory would be likely to demand; but this ideal was not attained without certain necessary sacrifices. In matters of fortification the experiences of war appear sometimes to reverse the order of importance which theory has prescribed, and a parapet composed mainly of large, hard and sharp stones, would perhaps prove to be a greater practical disadvantage than a caponier of only one story, or even the absence of a drawbridge.

Reviewing the development of fortifications as dealt with thus far, it appears impossible to escape the inference that the teaching of war had been too frequently neglected, and that mere theory has been permitted to run rampant. The best fortification, judged by results, has been that improvised by stress of circumstance, unspoiled by the debasing influence of the text-book, and not demoralized by the technical possibilities opened out by large expenditure. In the works

¹ The only comparative experiment to which the writer is able to refer is recorded by von Brünner.

1. *Scarp 30 ft. high, Counterscarp 22 ft. high.*

The time, from the arrival of the escalading party at the top of the counterscarp to the moment when 20 men had climbed the parapet, was 8½ mins.

2. *Detached wall 20 ft. high, Counterscarp 17 ft. high.*

Time, also 8½ mins.

Assuming parallel conditions to have been secured, the detached wall proved to be the best physical obstacle, for it was little over half the height of the competing scarp and was combined with a counterscarp 5 ft. lower.

The increase of the obstacle to escalade secured by the adoption of the detached wall is now recognized in our text books.

constructed within the past 30 years at our home ports and fortresses abroad, no sufficient indication of the results of the experience obtained in the French war, the Crimea, and the great American struggle, can be traced. Some of these works might have been designed by clever cadets, quick to recognize the niceties of technical artifice; but unable from sheer immaturity of thought and want of study to grasp the broader aspects of the science in its relation to war. It is nevertheless evident that the rich and varied war experience available was fully appreciated by many of the best minds, and that but for the want of all real organization of scientific thought, the progress of fortifications would have been more wisely ordered.

Illustrations of the way in which the science has lagged behind its leaders could be multiplied indefinitely. To take one simple specific instance; as has been pointed out above, the embrasure was roundly condemned in 1796. In 1239 Smola¹ pointed out that high carriages were essential. In the judgment of the Prussians, Düppel killed the low carriage and embrasure for siege batteries, *a fortiori* both ceased at the same time to be applicable to the front faces of land works, and Colonel (now General Sir L.) Simmons stated in 1865—"I think it is very doubtful if we should use embrasures at all."² The siege of Paris might surely have served to remove any lingering doubts on the subject; yet, more than three years later, haxo-casemates—infinitely more objectionable than embrasures were being erected on the front faces of a land work, and the same anachronism was perpetrated even as late as 1833.

Precisely similar evidence is forthcoming in relation to coast batteries. Sir J. Jones significantly recorded the experience obtained in the naval attack on the Castle of Scylla in 1806, where it was "altogether surprising to observe the mischief which had been produced by shot which had deflected from the cheeks of the embrasures and entered the casemates."³ Sir J. Burgoyne, in a paper written in 1849, stated—"Among the inconveniences apprehended to coast batteries are the openings of embrasures in masonry by which shot that would otherwise have turned without injury . . . are deflected on to the gun and into the battery."⁴ This principle, so clearly recognized, has been widely ignored. Not to allude to other cases, the splayed vertical walls 10 ft. high which effectually neutralize the value of the guns in Fort San Leonard at Malta sufficiently prove the divorce between theoretical fortification and the teaching of war.

Again, about 40 years ago, Sir H. Jones wrote—"It becomes the duty of the Engineer charged with the defences of a maritime fortress so to arrange his batteries that the defence may be from several points distant from each other . . . on commanding situations, and not *à fleur d'eau* which has heretofore generally been the case . . . for the principal defence, height must be attained."⁵

¹ Handbook for *k.k. Artillerie Offiziere*.

² R.E. Professional Papers, Vol. XIV.

³ Peninsular Siege.

⁴ Coast Batteries. R.E. Professional Papers, 1849-50.

⁵ Peninsular Sieges. Editor's note.

Sir J. Burgoyne at nearly the same period, held that "the best disposition for guns against shipping is to disperse them very much."¹ The experience of Sebastopol fully bore out the above views, and Todleben enforced the lesson with the weight of his great authority supported by the results obtained by the fire of the Telegraph and Wasp batteries. The results of this plain teaching are not specially apparent.

Sure and certain progress in fortification can be attained only by a careful study of the war experience of the past, combined with the indefinable faculty which can grasp, retain and apply great principles without being either swayed by the spurious authority attaching to formulas oft repeated, or led astray by the Will of the Wisp lights of mere coloured instances. Is there any guarantee in recent writings that such sure and certain progress is now in operation?

¹ Coast Batteries. R.E. Professional Papers, 1849-50.

Siege Operations of Franco-German War, 1870-71.

Appendix E.

No.	Name.	Date of surrender.	Resistance (days).	Cause of surrender.	Remarks.
1	Lichtenberg.	10th Aug.	1	Bombardment (field guns).	Old castle in the Vosges. <i>Enceinte</i> with deep revetted ditch. Very little bombproof cover. Garrison 280, of whom 240 were fugitives from Wörth. Surrendered after 1300 rounds, which caused fires to break out in interior.
2	Lützelstein.	9th Aug.	<i>Nil</i>	—	Old mountain fort partially in ruins. Evacuated after the battles of Weissenburg, Wörth and Spicheren.
3	Marsal.	14th Aug.	$\frac{1}{2}$	Threat of bombardment (field guns).	Seven bastions; wet ditches. Capitulated on threat of field gun bombardment; only 21 rounds fired. Garrison "16 officers and several hundred men."
4	Vitry.	25th Aug.	<i>Nil</i>	Do.	Nine irregular bastions; no casemates or outworks; no preparations for defence. Commands St. Dizier-Châlons railway. Garrison 300 men, "all Gardes Mobiles," who had not yet received their clothing.
5	Pfalzburg.	12th Dec.	94	Bombardment (field guns). Provisions run out.	Six regular bastions with ravelins; good casemate accommodation. "Perfectly secure against assault." Bombarded by 60 field guns (24 heavy) of 12th Division, 6th Army Corps, on 14th; the guns being placed in batteries; about 1800 rounds fired. Houses much injured; defences hardly touched. Germans then left the fortress leaving small body in observation. Formally invested 19th August. Regular siege contemplated, but given up. Heavily bombarded 25th November. Provisions would have run out earlier, but for the accidental arrival of a convoy after Wörth.

Siege Operations of Franco-German War, 1870-71.—Continued.

Appendix E.

No.	Name.	Date of surrender.	Resistance (days).	Cause of surrender.	Remarks.
6	Bitsch.	—	never	taken.	Built in 1741 and subsequently improved. Upper front strongly built on sandstone rock, with a lower bastioned <i>enclinte</i> enclosing town. Citadel with flanked ditches. Exceptional amount of bombproof cover. A few rounds fired at the fortress on 8th August. 2nd Bavarian corps compelled to march round it in three forced marches over roads so bad that infantry had to pass them in file. Bombardment began 23rd August, and carried on succeeding days. On 11th of September bombardment re-commenced with addition of 16 heavy siege guns and 4 mortars. Results "inconsiderable" but town suffered greatly, subsequently this fortress was merely observed till end of war. Garrison about 3000 strong, commanded by Lt.-Colonel Theyssier, made several sorties.
7	Toul.	24th Sept.	37	Blockade and bombardment (siege and field guns). Artillery ammunition exhausted.	Bastioned nonogon; no outworks; no casemates. A few blindages made on the ramparts. Garrison lodged in private houses and huts. Position very important as barring the Strasburg-Paris line which was much needed to bring up stores before Paris. The "complete and excellent railway organization became paralysed at Toul." First summoned to surrender 14th August. Bombarded by two field batteries of 4th Army Corps on 17th August. Invested. Bombarded on 23rd August and subsequent days. Heavy S.B. guns brought up from Marsal with much difficulty, and fortress again bombarded 9th and 10th September. Besiegers reinforced on 13th September. Bombarded on 17th and 18th September by seven field batteries and ten French guns from Marsal. Siege Train arrived 20th September. Intention to breach and then attack from a parallel at 500 yards from the fortress. Siege guns opened 23rd September. "From the first no great result was anticipated from [the fire of

Siege Operations of Franco-German War, 1870-71.—Continued.

Appendix E.

No.	Name.	Date of surrender.	Resistance (days).	Cause of surrender.	Remarks.
13	Metz.	27th Oct.	67	Blockade.	Four large detached forts and five intermediate works; none of them completed. Bastioned <i>enceinte</i> with wet ditches and advanced works. Commands junction of railways to Nancy, Thionville and Saarbrück. Preparations for defence only begun after battle of Forbach. Invested 20th August. Idea of a siege "renounced from the very first." French made two efforts to break out, bringing on battles of Noisseville 31st August and 1st September, and Woippy 7th October. Garrison surrendered 179,000 strong.
14	Verdun.	8th Nov.	43 (from 25th Sept.)	Bombardment (siege and field guns). Regular siege threatened.	Bastioned <i>enceinte</i> with citadel rebuilt by Vauban. Bombarbed by field guns 24th August, and again on 25th September. French held some of the suburbs till 12th October. Siege gun bombardment (52 guns, 4 howitzers, 4 mortars) began 13th October, lasted 54 hours. Attempt to breach failed on account of range (2400 paces) and inaccuracy of French 24-prs. brought from Sedan. Sortie 28th October, spiked several siege guns. Preparations for siege made after fall of Metz. German force raised to 15,000 with 140 guns. Garrison surrendered about 4,150 strong.
15	Soissons.	16th Oct.	21	Bombardment (siege and field guns). Breach.	Irregular bastioned <i>enceinte</i> "bombproof barracks entirely wanting." Commands junction of railway to Nanteuil, Laon and Rheims. Escarps visible to foot in some places from high ground within range. Invested by 7th Landwehr Division about 24th September. Outside villages held till 9th October. Siege train (26 guns 10 mortars) brought from Toul opened fire 12th October. French replied with 18 guns. Practicable breach 45 to 50 paces broad, repaired by French night of 14th-15th, though "an incessant fire" was directed upon it. Garrison surrendered about 4000 strong.

Siege Operations of Franco-German War, 1870-71.—Continued.

Appendix E.

No.	Name.	Date of surrender.	Resistance (days).	Cause of surrender.	Remarks.
16	La Père.	26th Nov.	10	Bombardment (siege and field guns).	Town wall flanked by towers "in the manner of the middle ages." Completely looked into from adjacent heights. Garrison "without bomb-proof cover of any sort." "No cellars" for the civil population. Commands junction on Leon-Paris railway. Closely invested 15th November. Bombardment (16 siege guns, 6 mortars) began 25th. Results overpowering. Garrison surrendered about 2000 strong, "chiefly Gardes Mobiles."
17	Thionville.	24th Nov.	11 (from 13th Nov.)	Bombardment (siege and field guns).	Elaborate bastioned <i>enceinte</i> by Vauban and Cormontaigne astride of the Moselle. Commands Metz-Luxemburg railway. Observed from 8th August. Closely invested from 13th November. Siege park of 128 guns and 30 mortars brought up. Bombardment began 22nd November, and continued for 52 hours. French guns maintained their fire for first 24 hours; then ceased as "garrison had to be employed almost solely in extinguishing the fires in the town." Loss on both sides extremely small. Germans, 10; French, a few killed, and 40 wounded. Garrison surrendered, about 4000 strong.
18	Montmédy.	14th Dec.	28 (from 16th Nov.)	Bombardment (siege and field guns).	Old <i>enceinte</i> by Vauban on conical hill 200 feet high; eight irregular bastions and six ravelins; commands Sedan-Metz railway. Field gun bombardment (seven batteries of the Guard Corps) on 5th September caused loss to the garrison of 18 men. Germans then marched on. Closely invested 16th November. Bombardment by 38 siege guns, and 36 field guns, and 4 mortars, began 12th December, continued 30 hours. Effect very great, "hardly a house remained uninjured." Garrison surrendered, about 3000 strong. German loss, 12 wounded; French loss, under 100.

Date of surrender.	Resistance (days).	Cause of surrender.	Remarks.
25th Jan.	29	Bombardment (siege and field guns). Partial regular attack.	Bastioned hexagon, circumference, 2563 yards; built by Vauban in 1680, (1st system); three advanced lunettes at foot of glacis. Commands Luxemburg Railway. Invested about 26th December. Siege Corps about 11,000 with a train of 40 guns and 30 mortars, exclusive of field guns. Shelled by field guns occasionally from 16th to 19th January. Bombardment began 19th January and continued till evening of 24th. Parallel began night of 21st-22nd January 1000 paces from the fortress. Defence exceptionally vigorous. Efforts made to impede investment. Several siege guns dismounted by fire. Garrison, commanded by Col. Manaroly, (a Corsican), surrendered nearly 4000 strong.
1st Jan.	9	Bombardment (siege and field guns).	Bastioned quadrangular <i>enceinte</i> about 1000 paces by 350 paces " <i>very complicated</i> " and " <i>only of interest for the Engineer.</i> " Commands important railway junction. Reconnoitred 2nd September. Invested about 22nd December. Siege park, 69 guns, 14 mortars, and 5 field batteries. Bombardment began 31st December, lasting 27 hours, produced great effect and set town on fire. Garrison surrendered about 2000 strong.
28th Jan.	131	Blockade and bombardment (siege and field guns).	Bastioned <i>enceinte</i> , 15 detached forts (average interval 3500 paces) designed in 1840. Prepared for defence after defeats on the frontier. Investment complete about 19th September. Siege train, about 300 guns and mortars, with 500 rounds per piece. Bombardment <i>E</i> front began 27th December; <i>S</i> front, 5th January; <i>N</i> front, 21st January. Loss of garrison, about 17,000.

Date of surrender.	Resistance (days).	Cause of surrender.	Remarks.
15th Feb.	103	Regular siege.	Pentagonal <i>enceinte</i> , chiefly Vauban's, 3rd system; two detached forts and two advanced forts connected with <i>enceinte</i> . Great preparations made by Colonel Denfert of the Engineers. Commands important railway junction. Investment complete 3rd November. Investing force threatened by Bourbaki's army. Outlying villages held by French till 23rd November. Bombardment begun 3rd December. 1st Parallel completed 21st January; 2nd Parallel, 1st February. Les Perches, two provisional redoubts, unsuccessfully assaulted night of 26th January. Les Perches taken 8th February from crowning of glacis. Haute Perche practically undefended. Perches positions then armed with 60 guns and saps pushed forward towards citadel. Garrison about 17,000. Loss of besiegers 2100.
9th Jan.	12	Bombardment (field guns).	Irregular bastioned <i>enceinte</i> armed with S.B. guns only. Commands Amiens-Terguier railway. Blockaded 27th December. Bombardment with field guns began 28th December. Town much injured. Garrison about 3000, chiefly Mobiles.
5th Jan.	3	Bombardment (field guns).	<i>Enceinte</i> with five bastioned fronts. Masonry exposed everywhere. No bombproof cover for garrison. Invested 2nd January. Bombardment by six field batteries began 5th January. Garrison 160 Gardes Mobiles and 120 Line and Engineers.

Appendix F.

EFFECT OF GERMAN FIRE ON PARIS FORTS ON SOUTH FRONT, &c.¹

Permanent Works.

Issy.—Of the four barracks in the interior, three were burnt and one was breached and rendered uninhabitable. The two old powder magazines were not breached but the arch was bared in one place. Of 19 casemates in S.W. curtain (*see* Pl. I.) five were breached and the rest injured by the fire of the short 24-prs. This damage was due to random shots, and systematic breaching operations were “not attempted.” The following guns were dismounted :—

2	...	...	...	16 cm. rifled.
5	...	...	...	24-prs. "
4	...	...	...	12 " "
4	...	...	...	16 " S.B.
2	...	...	...	22 cm. S.B. Howitzers.

Total ... 17

The embrasures were soon obliterated. The maximum loss in one day was three killed and eight wounded, but men deserted on account of the painful discomfort.

Vanves.—Two barracks were breached and rendered uninhabitable. Two powder magazines in the interior of the fort were also breached. The casemates were penetrated in many places, and the parapet much damaged. The rear face suffered severely from reverse fire. The following guns were dismounted :—

2	...	...	...	...	16 cm. rifled.
7	...	...	...	...	24-prs. "
2	...	...	...	...	12 " "
1	...	...	...	...	18-pr. S.B.

Total ... 12

Montrouge.—Less injured generally, but gorge more severely damaged by reverse fire than that of Vanves. The *debris* fell into the ditch and formed an almost practicable breach.

Bicêtre and Ivry seem to have escaped injury.

Enceinte.—"The damage done was chiefly confined to the neighbourhood of the Point du Jour and the bastions near the river on the Vaugirard side." "The guns here had apparently been dismounted and the embrasures had been much injured." "The curtain was covered with shot marks, but not breached." "The salient at the Point du Jour, though well traversed, was reduced to a nearly shapeless mass of earth." "The large hollow traverses on the terreplein were in nearly every case intact, and the excellent temporary cover under them was in every case quite so."

¹ Extracted from "Belagerung von Paris," Heyde u Froese, and notes by Lieut. Fraser, R.E., in Corps papers, Vol. XX., 1872.

Temporary Works.

Hautes Bruyères Redoubt "but little damaged," all the embrasures had been repaired, and only one of the bombproofs showed signs of injury. The following guns were found intact in this work :—

5	...	...	...	...	16 cm. rifled.
8	...	...	...	...	24-prs. "
2	...	...	...	...	27 cm. mortars.

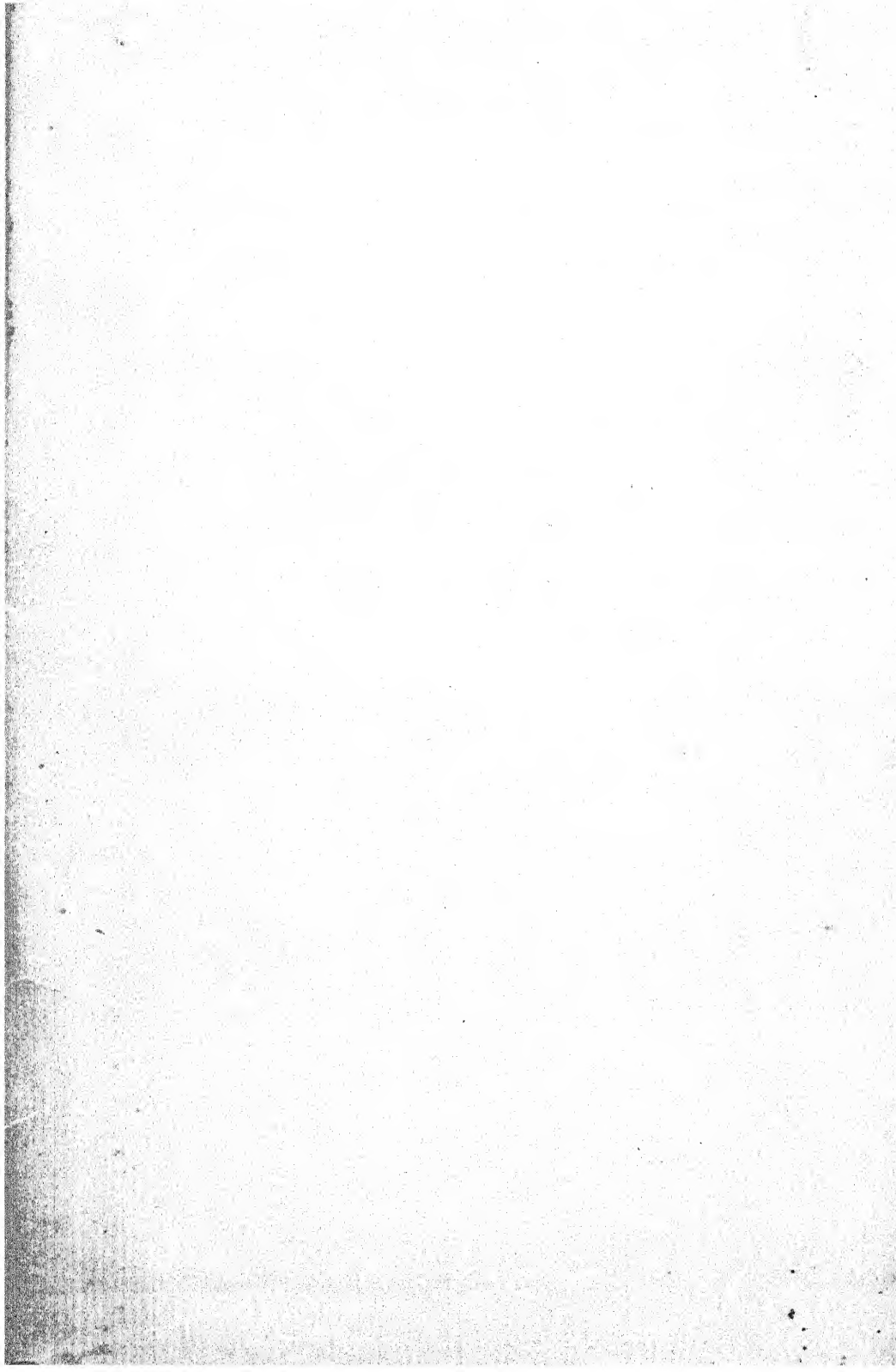
Park Battery of Issy "very little damaged." *Kirchof Battery* showed no signs of injury, but had probably been repaired.

Chamart Station Battery had two guns dismounted out of six. *Mortar Battery behind embankment* intact. *Spur Battery West of Vanves, batteries East of Vanves and battery between Vanves and Montrouge* had two guns dismounted only.

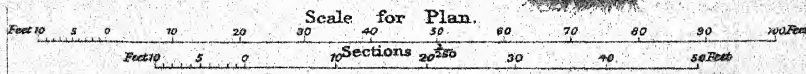
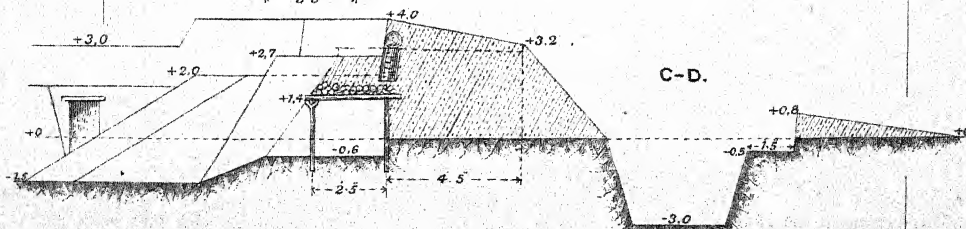
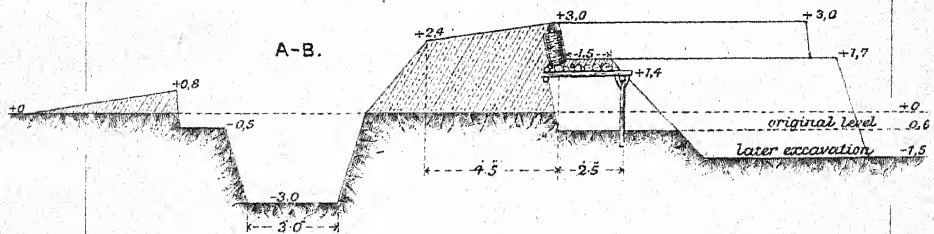
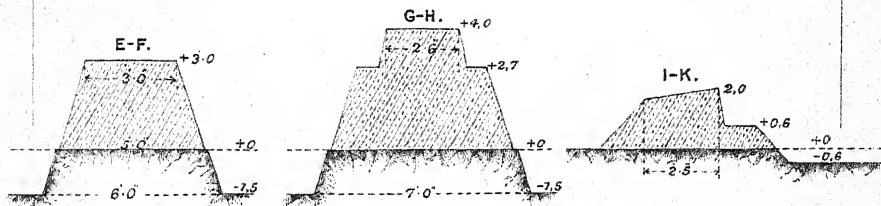
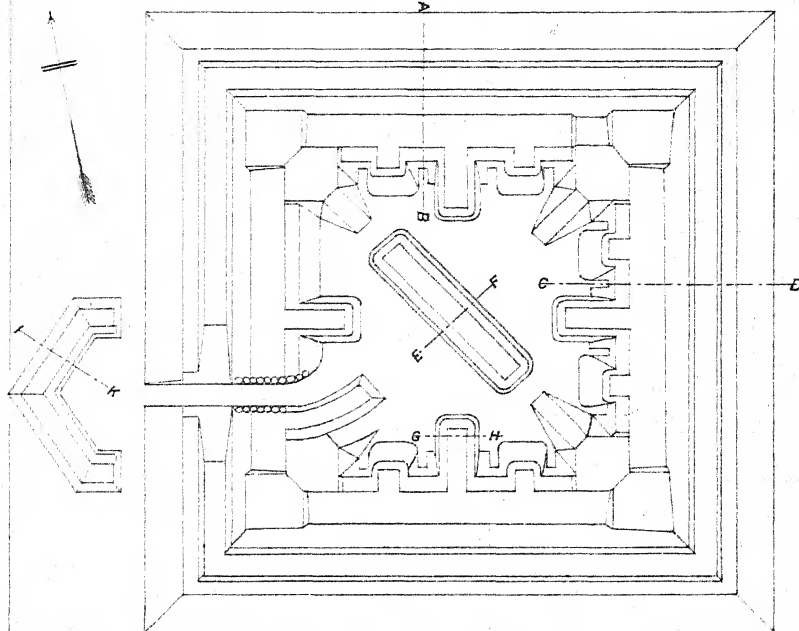
Five other temporary batteries merely shewed a few shell marks. *Annex Battery West of Montrouge* suffered considerably having neither traverses nor bombproofs.

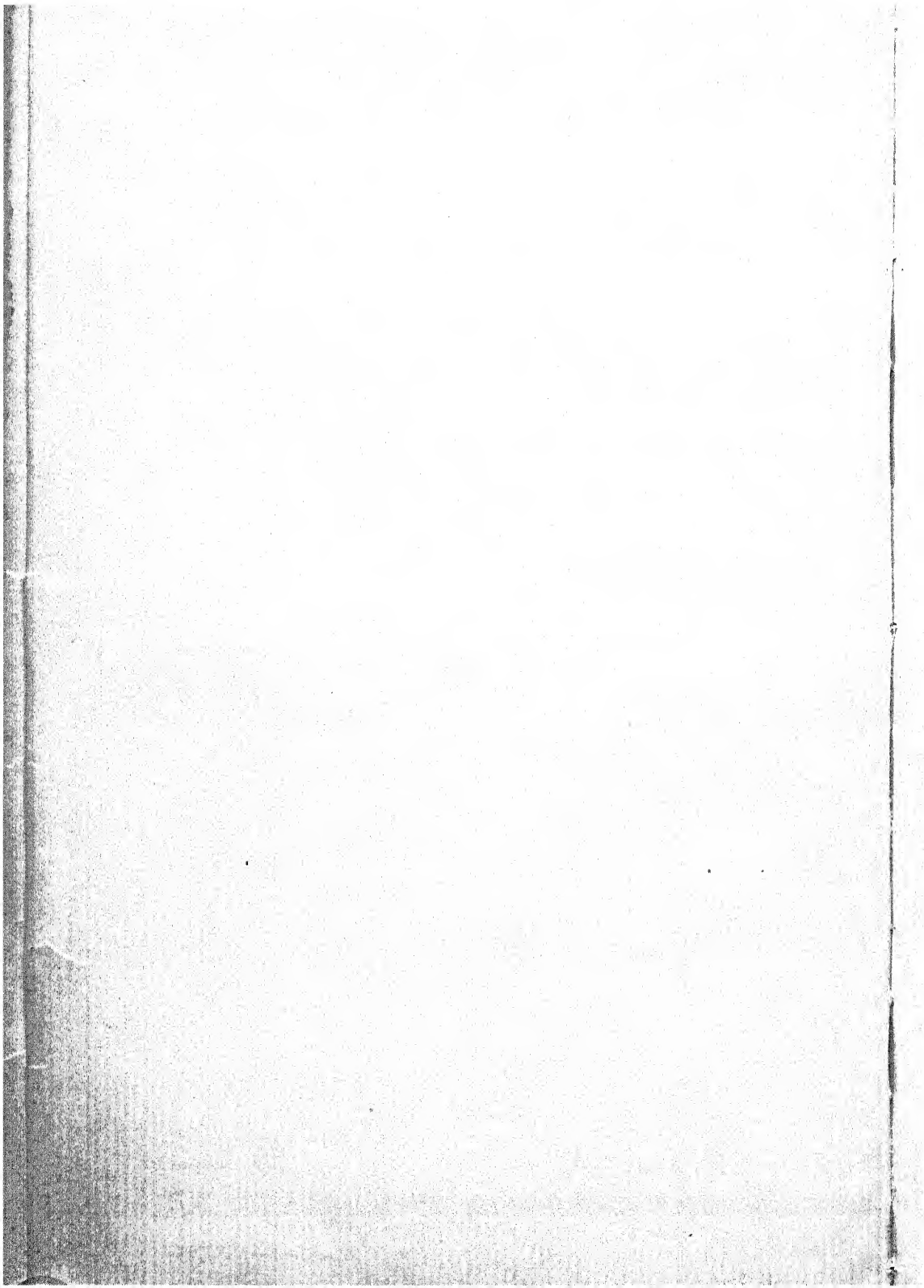
General.—The damage to parapets, with the exception of embrasures "amounted to little furrows at the crest and inconsiderable craters in the exterior slope."¹ The effect of enfilade fire on the forts was considerable. Traverses rising 6' 0" above the crest line gave security to one gun only.

¹ Geldern, 1872.



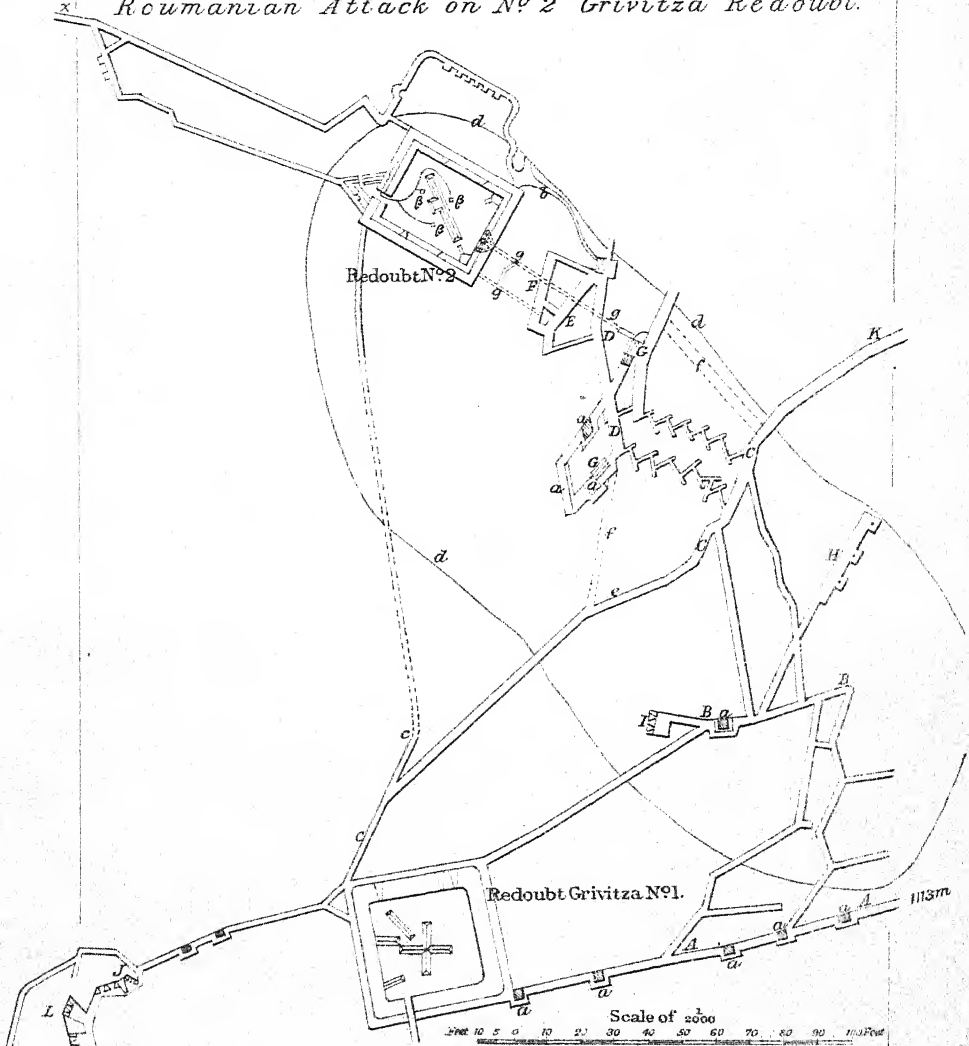
PLEVNA DEFENCES, 1877.
No 2. Grivitza Redoubt.





DEFENCES OF PLEVNA. 1877.

Roumanian Attack on N° 2 Grivitza Redoubt.



AA. 1st Parallel.

BB. 2nd Parallel.

CC. 3rd Parallel.

DD. 4th Parallel.

EE. 5th Parallel.

FF. 6th Parallel.

GG. Trench Cavaliers.

HH. Mortar Battery.

II. Battery against the town

JJ. Battery against Bucova.

KK. Junction with the parallel Trench.

LL. Batteries.

aa. Traverses.

bb. Turkish trench.

cc. Old Turkish covered

way between the redoubts.

dd. Brow of hill.

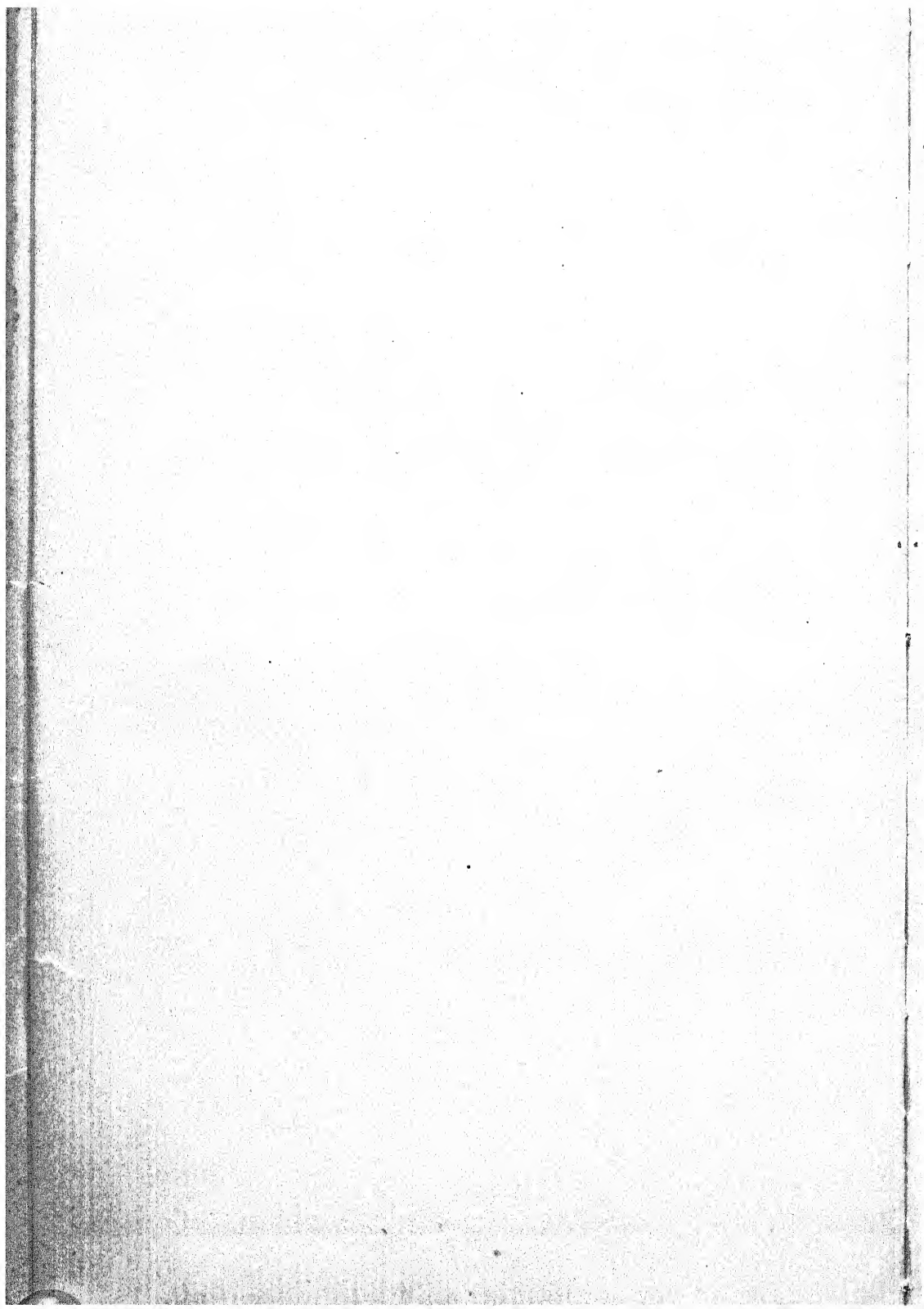
ff. Trenches in course of construction.

gg. Mine galleries.

xx. Covered way leading to Turkish works of Bucova.

Scale of 2000

0 10 20 30 40 50 60 70 80 90 100 Feet



METHOD OF OBSERVING PRACTICE.

BY

CAPTAIN L. C. M. BLACKER, R.A.

THE following very accurate method of observing and recording practice may be employed with Watkins's depression range-finder in any cases where the range party can occupy a position on land at right angles to the line of fire, and between 300 to 600 yards from the target.

On the principle that one minute of deflection is equivalent to one inch in each hundred yards of range, the distance short and over of each shot can be accurately measured by using the horizontal graduated circle on the range-finder, and observing the angle between the lines drawn from the instrument to the target and to where each round strikes the water.

Since the vernier on the arc reads as low as 15 minutes, and the divisions may be judged as low as 10 minutes, at 240 yards each 15 seconds is equivalent to one yard, and at 360 yards 10 seconds is also equal to one yard, it follows that the exact distance short and over may be measured and easily calculated for each shot.

The best ranges are (from range party to target):—

240 yards at which 15 seconds is equivalent to 1 yard.

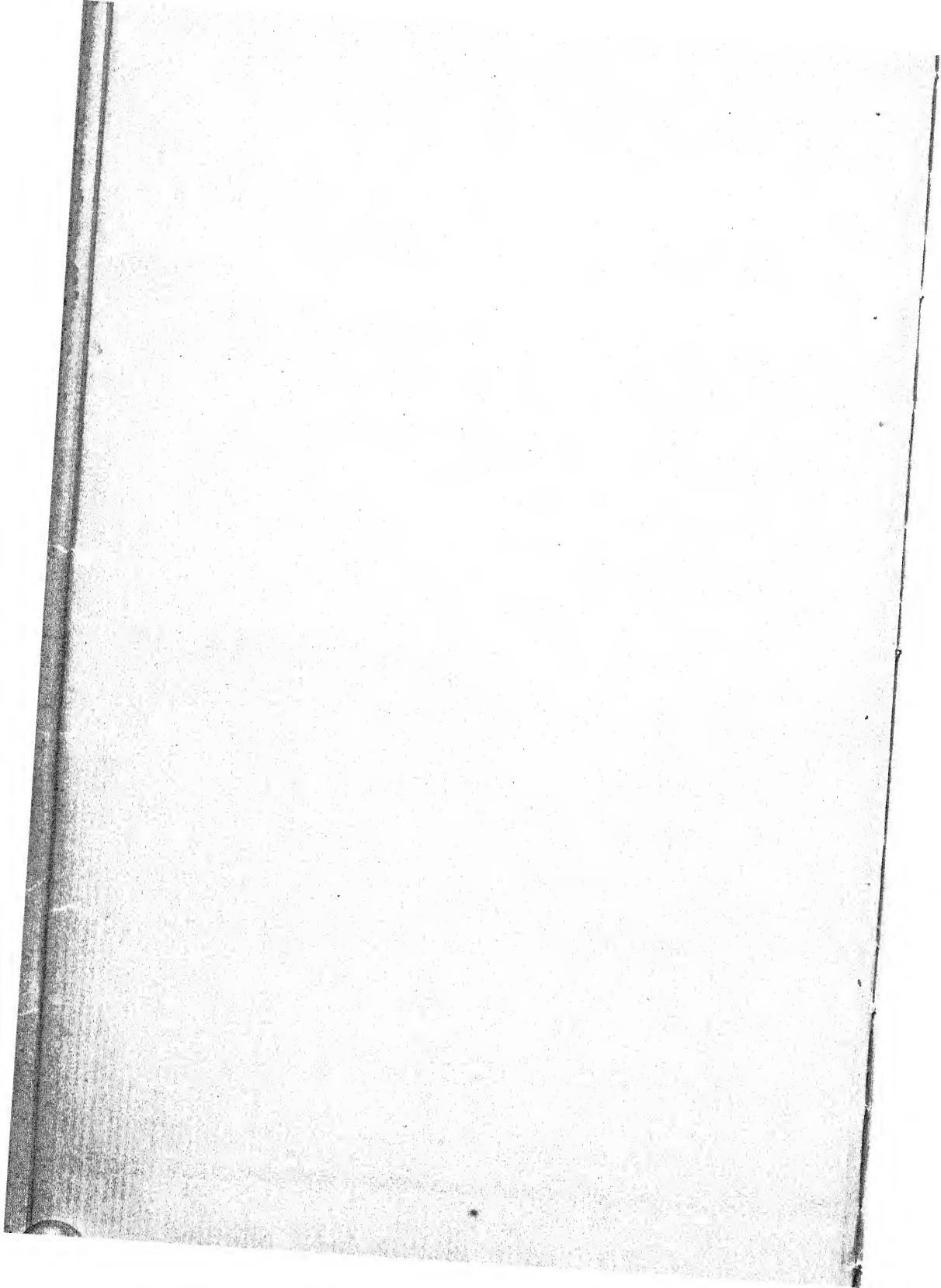
360 " " 10 " " 1 "

480 " " 15 " " 2 "

720 " " 10 " " 2 "

though intermediate ranges can, of course, be used. The target can easily be moored by signal to any range required from the observer and the gun. Some little difficulty, however, is experienced in finding the height above water level of the point occupied by the range party, though by using a map or chart and known ranges this can easily be determined.

The above method can also be used from the battery in a lesser degree in measuring the distance right and left that the shot falls at the target.



NOTES ON MINOR TACTICS.

BY

LIEUT.-COLONEL S. C. PRATT, R.A.

ADVANCED GUARDS AND ADVANCED CAVALRY.

Advanced Guards.—The advanced guard of a force on the march fulfils for it duties somewhat similar to those carried out by outposts at the halt. It is a strong detachment preceding the main body, which, in conjunction with flanking parties and a rear guard, affords to it *security* and procures for it information.

An army or large force always marches with as broad a front as is consistent with tactical requirements. This necessitates a division into several columns, each following a separate route. The object of the march, the nature of the country, and the number and direction of the roads regulate the number of the columns. Preceding the main body of the force may be a *general advance guard*, composed of an army-unit, or each column may have an *advanced guard* of its own—care being taken that thorough intercommunication be maintained between the advanced parties, and that they move in unison. Where there is a *general advance guard* it will march in several interlinked columns, so that we can confine ourselves to considering the formation of an advanced guard preceding a single column, only taking care to remember that it may be linked on either side to similarly formed bodies.

Their Duties.—The duty of an advanced guard is to facilitate the march and guard against surprise. The country passed through must be thoroughly explored and all obstacles to the march of the main body removed; the movements of the enemy must be ceaselessly watched, and his advance in force be checked. In presence of an enemy too strong to push aside, it has “not to advance or retreat, but manœuvre.” It has thus two opposite functions to perform, one to be the eyes and feelers of the force, the other to arrest and contain the enemy. Modern warfare has to a great extent separated these two duties. An independent force of Cavalry is pushed far in advance to search out the enemy and report his movements, while to the advanced guards is left chiefly the task of making a preliminary resistance. As, however, in many cases there cannot exist a Cavalry veil, and in some cases where it does exist, it may be temporarily ruptured, it is necessary to have a *normal* march formation for advanced guards fitted for all eventualities.

Their Composition.—The normal duties being to *observe* and *resist*, it is obvious that all three Arms can be employed with advantage. Unlike outposts, an advanced guard is constantly passing over new phases of ground, and must be formed to suit ever varying conditions. Formed as a miniature army the proportion of each Arm will vary according to the general features of the country, and the special duty that is imposed by the character of the enemy. The proportion of Cavalry will depend on the opportunities of reconnoitring afforded by either openness of the terrain or the absence of a Cavalry veil. Infantry, the resisting force, will be numerous in close ground, or when a strong defensive power has to be utilized. Artillery aids the Infantry, its positions on the march and numbers being influenced by nature of routes passed over.

Strength of Advanced Guards.—On account of its arduous duties the minimum strength, adequate to requirements, should be used. Detachments from a main body tend to impair its unity of action when a crisis arrives. The modern tendency is to make advanced guards exceptionally strong; one-fourth to one-sixth of the force. Some recent French writers recommend as much as one-third. The employment of large advanced guards in 1866 and 1870, was attended with success, but the disadvantage is obvious. The advanced guard becomes in the case of large forces the *first fighting line*. Its commander, on account of the numbers at his disposal, has a tendency to force the fighting and get engaged in an action which is beyond his power to bring to a decision without the intervention of the main body, which is thus forced to fight, however unsuitable the conditions or disarranging to preconceived plans.

Assuming that advanced guards should as a rule “*manceuvre*” and not get involved too deeply in a preliminary fight, the modern strength seems excessive, especially when it is remembered that the effect of improvement in modern weapons has undoubtedly increased relatively *the delaying power of small bodies*. As long as Cavalry and Artillery are alone committed, a fight can easily be stopped, but this is not the case with Infantry, and leads to the conclusion that only sufficient Infantry to support the other two Arms should be provided.

A strength in keeping with the arrangements of foreign nations would be as follows :—

Advanced guard of an
English Division.

{ Three and a half squadrons of Divisional Cavalry.
Two battalions of Infantry.
One Battery.
One half company R.E.
One half bearer company.
Detachment Mounted Infantry.
Three machine guns.
Infantry reserve ammunition.

Advanced guard of a mixed Brigade.	{	Three and a half squadrons of Cavalry. One half battalion of Infantry. Two guns. One half company R.E. One section bearer company. Detachment of Mounted Infantry. Two machine guns.
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Advanced guard of an Infantry Brigade.	{	Four companies Infantry. Two machine guns.
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In the case of a small body of troops the function of resistance is not necessary, and observation can be attained by a proportionately small fraction of the main body—about one-tenth, or even less. In the case of a small force, such as a battalion, a troop of Cavalry or one or two companies of Infantry form the best advanced guard.

Distance from the Main Body.—The advanced guard must be within effective distance from the main body, and at the same time be sufficiently distant from it to give it sufficient time to let it prepare for battle. The distance will also vary in proportion as the nature of the country passed through lends itself to defence. It is generally stated that the distance should roughly approximate to the length on the march of the main body. This reasoning, however, is untenable, as it rests on the inadmissible hypothesis that the advanced guard should be liable to surprise. The distance for an English Division and Army Corps should not as a rule exceed one and two miles respectively. In the case of an advancing army, covered by an Army Corps it may be a day's march ahead, but the modern tendency is not to exceed five miles as a maximum. *Ex.*—In the advance of the First and Second German armies towards Saarbrücken, the advanced guards were from three to four-and-a-half miles from the main body. In passing through the Trautenau defile in 1866, the advanced guard of the 2nd Division was one-and-a-half miles ahead.

Order of March.—The troops leading the advanced guard regulate the rate of advance of the main body. As, in addition to advancing, they have to reconnoitre and to remove obstacles, they must be very mobile. Cavalry then when the ground admits of it takes the head of the column. As Cavalry has to fall back in presence of small bodies of hostile Infantry, and cannot pass through intricate ground without danger, it must be supported by Infantry, whose duty will be to arrest an enemy either by offensive or defensive action. The Artillery must be sufficiently far forward to meet the *first shock* of an enemy and assist the Infantry without exposing itself to capture.

A large advanced guard naturally divides itself into—

(1.) A Van-guard of Cavalry (or Cavalry and Infantry in close country) or a body which furnishes the patrols and scouts and gives them sufficient support (corresponding to picquets and sentries). The patrols are of two kinds, one to reconnoitre to the front and flanks, the other to keep up connection with neighbouring columns.

(2.) A Reserve (corresponding to support), which follows the Van-guard at some 1,000 to 3000 yards according to the country, whose mission is solely to fight, for which purpose the troops (chiefly Infantry and Artillery) of which it is formed are disposed so as to come quickly into action.

Van-Guard.—The actual arrangement of the troops on the ground will vary considerably according to the circumstances of the case, but the following general type of formation for a Division acting independently may serve as a guide.

The front line would be an advanced party of scouts, composed of small groups of from three to five mounted men, keeping in sight of each other. These would be supported in rear by the remainder of the troop or squadron furnishing them. It would be rarely necessary to employ more than 100 mounted men. Some one-and-a-half to two miles in rear of the scouts advances the remainder of the Van-guard consisting of the bulk of the Cavalry supported by Mounted Infantry, and two machine guns followed by half a battalion of Infantry and the Engineer detachment.

The Van-guard would send out a strong section of mounted men to each flank, and each section would send out from it a flank patrol.

The scouts in front together with the flank patrols would ordinarily cover from two to four miles of ground. Communication should be kept up between the various parts of the scouting line and its supports, by means of connecting files and it seems probable that cyclists may under favourable conditions be utilized in this work.

Under exceptional circumstances the scouts and patrols may have to be formed of Infantry, in which case the area of ground effectively searched will naturally be reduced in extent.

Reserve.—Some 2000 yards behind the Van-guard would come the reserve of the advanced guard, at the head of which would be the Officer Commanding, together with sufficient orderlies to keep up communication with the front. Following him would be in successive order the remaining mounted troops, artillery, machine guns, infantry small-arm ammunition reserves and ambulance.

When a larger force of Artillery than a battery is present, the second échelon of wagons would march in rear, together with carts for such stores as may be thought indispensable. The tents and baggage of the advanced guard, the artillery reserve ammunition and the bulk of the supply wagons should be placed at the head of their respective sections in the supply train of the main body of the force.

Flanking Parties.—The flank of a line of march would be reconnoitred by Cavalry patrols, and, if necessary, by the detachment of a squadron of Cavalry to points where an enemy might be concealed. In some cases a regular flanking detachment, marching parallel to the column, is necessary and would be composed of the three Arms. In the case of a Division, this might consist of a squadron, a battalion and two guns, the force taking precautions for its own security, and keeping up connection with the advanced guard.

Advanced Guard Tactics.—An advanced guard must not let itself be stopped by demonstrations of small bodies of the enemy—"never haggle with the enemy's light troops." Skirmishers are at once sent out and the enemy driven back without delaying the advance of the army. A vigorous offensive is generally advisable, especially to acquire a good fighting position, gain the command of a defile, &c.

If large bodies of the enemy are seen or if his troops are formed in position, the advanced guard commences a *reconnoitring* action, endeavours to draw the fire of his guns, and find out how he occupies the ground. The guns come into action at long range and fire slowly. The Cavalry work towards the flanks and endeavour to get information.

Time must be allowed for the reserve of the advanced guard to come up and then, if conditions are favourable, the attack must be pushed with the utmost vigour.

If the task appears beyond the strength of the advanced guard the enemy should be kept engaged to the extent that he cannot withdraw, and the further decision as to the conduct of the fight rests with the commander of the main body of the troops which are gradually coming up to the scene of combat.

When an advanced guard is thrown on the *defensive* by the attack of a superior force, its duty is to hold its ground and not fall back. Cavalry and guns work generally on the flanks of the line, and the ground, if possible, is artificially strengthened. The moral effect of a retreat is so bad that even guns should be sacrificed rather than give way. The task of defence is rendered the easier on account of the support derived from the advance of the main body. In the case, however, when the attacking enemy is so superior in numbers as to necessitate the advancing force being forced to fall back, its main task will be to *gain time* by skilful manœuvring.

General Remarks.—The batteries of the advanced guard are constantly liable to be engaged, and if a serious action is the result, remain in action longer than those of the main body. Ammunition must therefore be husbanded, and firing be slow and deliberate when trying to expose an enemy's strength. If, however, an enemy is not strong, and a vigorous offensive is ordered, guns must advance boldly, and by a rapid, well-sustained fire, overcome resistance with as little delay as possible. Light batteries, as a rule, are used, heavy only being sent when a formidable resistance is expected, or obstacles have to be encountered. Advanced guard batteries are exceptionally exposed. To act as an escort and to fulfil the conflicting duties of observation and resistance, a force of Mounted Infantry appear an advisable adjunct. Whether riding or conveyed in light carts they would increase considerably the defensive power of the most advanced Cavalry. The utility of machine guns in an advanced force is now admitted, and future experience will show whether they will act best as an independent unit or as simply attached to the other arms. With the advanced guard would usually march an officer of the Head-Quarter Staff, for the purpose of assimilating and forwarding the

information collected, and choosing the next camp of bivouac. An officer of the Commissariat Department would make arrangements for collecting supplies in the districts passed through, either by means of requisitions or markets.

Advanced Cavalry.—The next great war will probably commence with a fierce and long-sustained Cavalry battle, as a natural result of the advanced position that Cavalry is forced to adopt in order to carry out its work of exploration. The employment of Cavalry in force, a long distance in front of an advancing army is no new practice; Napoleon constantly detached his mounted troops two or three marches ahead of his main body. It is not desirable to go back further than the war of 1870 for an illustration of the advantages an efficient Cavalry may gain for its own side, and the disasters that an improper use of the Arm may lead to. Aided as the Germans were in that campaign by the comparative weakness of their opponents, they are the first to recognize that what they did was but a first attempt towards gaining true efficiency. The result of the Franco-German war has given a great stimulus to the study of the organization and mode of employment of the Cavalry Arm, especially in its strategical aspect. The rapidity of modern mobilizations and the consequent advantage in ability to quickly take the initiative imperatively demands that Cavalry at the outset of hostilities shall play a prominent part. In future the concentration of hostile armies will be covered by a dense veil of Cavalry thrown forward, which will have the task not only of covering the assemblage of troops on its own side, but also the duty of rending the screen in front of the enemy. A Cavalry combat under such circumstances seems inevitable, and in order to be equal to such conditions a stronger and more efficiently organized Cavalry than has hitherto existed must be brought on the theatre of war. The basis on which the strategical action of Cavalry should be founded has been most exhaustively studied, notably by the Germans, French, and Russians, and the results of theory verified as far as possible by practice in peace manœuvres.

Duties of Advanced Cavalry.—The duties which may have to be carried out by an advanced Cavalry force depend much on the particular conditions of the campaign. In general terms, the Cavalry have to ensure the safety and security of the force they cover, and to protect its mobilization, to discover the presence of the enemy, and not to lose touch of him when once it is gained, to anticipate the enemy in gaining possession of special points, to hinder his mobilization and rupture his Cavalry veil, to explore and reconnoitre the theatre of war. A Cavalry advanced force has thus to conceal the movements of its own army, while endeavouring to discover those of the enemy. For the *service of security* the force must be able readily to concentrate and be prepared to fight; for the work of *exploration* a large extent of ground has to be covered and small mobile bodies kept constantly in motion and on the alert. Two distinct duties have therefore to be provided for, the former being carried out by what is usually termed the Cavalry

veil or *screen*, while the latter are performed by small bodies pushed forward to the front of it, termed *contact squadrons*, *patrols* and *advanced scouts*.

Mode of Action.—In order to carry out its duties the screen of Cavalry moves from one to three marches ahead of the army it covers, and is disposed so that a large force of Cavalry can be concentrated at any one point, so as to meet any attempt of an enemy to break through. To rapidly concentrate a sufficient force for fighting purposes, it is necessary that the Cavalry columns march near to each other, and hence a properly formed Cavalry veil can only be made by a large number of regiments. When a Cavalry screen is formed the troops march with proper precautions, the advanced guards sending out patrols and scouts in order to give warning of the approach of an enemy in force. In addition, the squadrons for exploring and gaining touch of an enemy are sent far to the front and may have for some time to act independently. As the hostile forces approach each other the exploring troops will be gradually forced back on the screen, and eventually return to the advanced guards from which they were sent out.

Variations in case of a weak Force.—The theory on which a large Cavalry force works is thus clear enough, but where the force is weak the difficulty arises as to how far a small force can carry out the joint duties of screening and exploration. One theory held on the subject is that the troops should extend on a wide front, thus forming really a strong exploring force with but little power of resistance. In such a case the advanced guards of the main army which is covered must be strong and be prepared for the rending of the Cavalry screen.

It is more usually contended however that the bulk of the Cavalry force, even if too weak in force to form a screen, should move in a concentrated formation, despatching towards the enemy numerous patrols and exploring parties. When an enemy's main line of advance is known, the bulk of the force moves opposite to it, ready to fight if challenged. Special detachments will generally be necessary on the flanks of the line of march to forestall a turning movement.

With a weak force of Cavalry acting against a strong one, it is a mistake to undertake too much under any false idea of forming a veil, which is in such a case a misleading term. Information about an enemy is primarily wanted, and this is gained by the action of small bodies. A Cavalry advanced force should not fight if it can be avoided, but if action is necessary, all available strength should be concentrated for the purpose.

Strength of Division.—The ordinary working unit of a large force is the Cavalry Division. Its strength should be six regiments, divided for choice into three brigades, of which the two composed of Light Cavalry perform the reconnoitring, exploring, and more advanced duties, while to the third heavy brigade appertains the main function of serious resistance. A larger force than this would be unmanageable in one command, while a smaller one would be deficient in resisting power. From two to three horse batteries are required. When a

brigade is acting to a certain extent independently, a battery would be attached to it, but generally the Artillery would be kept together in one command with the chief resisting body, and it would be seldom necessary to push it forward to aid the exploring troops in front. Batteries would not be detached to the advanced guards, except in case of pursuit. A light ambulance equipment, a couple of wagons of reserve ammunition, and a provision convoy of some 30 carriages are useful appendages—but in respect of provisions, the horses and men should generally be able to support themselves by requisitions.

Extent of Ground to be Covered.—The tendency after the war of 1870, both in the French and German armies, was to extend the front line over a great width, some 20 miles, and the French regulations especially tended a great dispersion of patrols and small supports, with the result, that seeking to be strong everywhere, they were weak at all points, and two-thirds of the Division was really out of the commander's control. It is now considered that in average country a Cavalry Division should not cover more than ten or twelve miles.

Contraction of Front in Contact.—When the enemy is at a distance the scouts can safely explore to a considerable distance from their supports, and contact squadrons, and special patrols may much extend the exploring zone, but as soon as the presence of the enemy is felt, there must be an immediate contraction so as to get resisting power. It will be often necessary to direct the columns on roads nearer one another, and watch the flank roads with small detachments. It is estimated that the main columns in order to concentrate with sufficient promptitude should not be more than six miles apart.

Marching Formation.—The marching formation of a Division depends in the first instance on the nature of the country assigned to it for exploration, and the proximity of the enemy. When the main body is obliged to keep on a single route, one brigade, with its battery, would form the advanced guard, while the other two brigades would follow. When two or more routes are followed, the extent of the country and resistance expected will determine whether it is better to have two brigades in front line, while a reserve brigade follows in rear, or have the three brigades marching side by side. In the latter formation the troops march more quickly, cover more country, and are more easily fed and quartered, and this order of march ought to have the preference when no contest is expected for twenty-four hours. The following is recommended as a *normal* formation. The two light brigades would divide the exploring zone between them, and march side by side, each pushing forward a regiment as an advanced guard. From the advanced guards would be detached to the front the scouts and contact squadrons. Some three or four miles of the rear of the centre would follow the reserve brigade.

Artillery.—The batteries would march behind the leading regiment of the reserve brigade, or may be allotted one to each brigade. The second arrangement is applicable in close country, and when resistance is but local, but it must be remembered that the three batteries have

to be got together before the Cavalry battle takes place. Batteries should not be pushed into the exploring line, but follow in rear of the advanced guards, or near the head of the main body.

Advanced Guards.—Whether marching on a single road, or on a wider front, a force equal to a brigade should form the advanced guard or guards. Detachments of considerable strength have to be sent forward from advanced guards for the duties of exploration. Again, it will frequently happen that troops and squadrons have to be temporarily sent away, and in order that the loss from all these causes should not interfere with the movement of the main body of the Cavalry, it is necessary that the advanced guards should be exceptionally strong.

Rear Guards.—Under ordinary circumstances no rear guards beyond those for police purposes is requisite. An exception to this rule must however be made in the case of an isolated column of Cavalry which should always have a strong rear guard, as the enemy may appear unexpectedly on its flanks. In such an event the rear guard should attack promptly, even if the enemy is superior in force in order to give the main body time to prepare for action.

Contact Squadrons.—The harrassing duty of establishing and maintaining touch of an enemy is sometimes carried out by sending forward one or more *contact squadrons* in front of the advanced guards of the main Cavalry force. The movements of these bodies are *independent* of the Cavalry Divisions, and depend exclusively on those of the enemy. Their special mission consists in intercepting post and telegraphic communications, destroying bridges and railways, occupying important defiles, gaining information of the enemy from the inhabitants and prisoners, seizing maps and supplies, &c. They should know the probable movements of the main force for some days so that they may be able to send daily reports to them. The commander of the squadron must take every precaution against being surprised, whether on the march or at night. When touch of the enemy has been once gained, it should never be relinquished. A temporary retirement in the face of a stronger force should be changed into an advance as soon as the pressure is relieved.

Officers' Patrols.—When long distances have to be ridden in 24 hours, such as 60 or 70 miles, and when the object in view can be better attained by a small than a large party, it is usual to send a well-mounted officer with a few selected men. These officers' patrols may be sent out either from the main body or the contact squadron. In the latter case the duration of absence and the length of the ride will be much less than in the former, in which they receive a special mission. The usual missions would be (1) To ascertain the enemy's strength and movements, (2) To reconnoitre a road, pass or river, (3) To convey despatches or establish communications.

Working of an Exploring Party.—An exploring party in the vicinity of the enemy must march with military precautions and not only

acquire information but arrange to send it back. The advanced scouts in open country would usually work in pairs, and in close country, in small groups on each road. The scouts should be allowed considerable freedom and independence of action, and should strive to get information without fighting. Their main difficulty will be the sending back of reports, and the officer commanding the party will have to fix certain points from time to time to which the reports have to be sent.

Rest at Night.—The position of small exploring parties at night is risky, and their best chance of safety is to change their position unknown to the inhabitants *after dark*, and for choice get into a wood. When solitary buildings can be found to pass the night in, they should not be entered till after nightfall, and none of the inmates allowed to leave. The men should sleep close to their horses, and take care there are some exits for escape.

Reports.—The establishment of communicating posts and relays between exploring squadrons and the Cavalry Division is impossible in an enemy's country. Leaving exceptional modes of communication, such as the telegraph, out of consideration, the only way of sending messengers is on horseback, or in a carriage. For long distances the use of requisitioned carriages is a necessity. Reports should always be duplicated, and news of importance should be sent in some simple cypher.

Connecting Posts.—Posts are used to keep up communication between detached bodies of Cavalry and the force they cover. They would generally be placed at easily recognized spots, such as cross roads or suitable houses, and would usually be about five miles apart. A N.-C. officer and six men is generally sufficient, two of the horses being kept ready to start at a moment's notice. The time of arrival and despatch of each report should always be noted on the back of it, and a receipt given to the bearer.

Communicating Posts.—These are employed to keep up lateral communication between squadrons, and consist of three men. The position of these posts should be decided by the leaders before starting, and the men forming them should be acquainted as far as possible with the routes taken by their own and neighbouring squadrons.

Formation of a Small Covering Force.—When a small force, such as a single regiment, has to cover the front, it is evident that it will possess but little resisting power, and this advantage must be compensated for by gaining early information and rapidly transmitting it. The regiment would move a day's march in front of the main body, and have three of its squadrons in front line, from $1\frac{1}{2}$ to 3 miles apart. The fourth squadron follows the centre one, and is placed so as to act as a reserve. From the leading squadrons would be pushed out strong patrols, some five miles in advance, while from the patrols small scouting parties may be detached.

THE BRITISH ARTILLERY IN THE WATERLOO CAMPAIGN.

CONTRIBUTED BY

COLONEL F. A. WHINYATES, (LATE) R.H.A.

ALTHOUGH 73 years have elapsed since the memorable campaign of 1815, it is probable that any authentic details of those days will be acceptable. It is therefore believed that the following particulars of the Artillery of the British Army engaged on the 16th, 17th, and 18th of June, 1815, will be read with interest. The papers were sent in 1816 to the *late* Major (afterwards General Sir Edward) Whinyates by the *late* Sir John May, K.C.B., who was Assist-Adjt.-Gen. to the Artillery at Waterloo. As will be seen, they were intended for publication, and though they were not printed then, it is perhaps not too late to carry out the original intention.

A column has been added to the return to show the present designation of such Troops and Brigades as still exist.

5th April, 1816.

MY DEAR WHINYATES,

My not being at Cambray and some little idleness has been the cause of your letter not being answered sooner.

I enclose a return of the Troops and Brigades employed in the Battle of Waterloo. Also a Memo. from which, with the return, I conceive you may make out something fit to meet the public eye, and I beg you will do so.

I am sorry to see by the papers that yours is the Rocket Troop to be reduced, at any rate the Driver Corps will be gainers by it.

We are beginning to be a little gay here; I think during the summer I shall take a trip to Brussels, but particularly to Amsterdam, Rotterdam and the Hague; I have little to do in England.

I am rather in haste to save the post, and therefore must conclude by assuring you that I remain,

Yours very truly,

J. MAY.

ORGANIZATION OF THE BRITISH, KING'S GERMAN, AND HANOVERIAN ARTILLERY PREVIOUS TO THE
BATTLES OF THE 16TH AND 18TH JUNE, 1815.

Colonel Sir GEORGE WOOD, Commanding Artillery. Lieut.-Colonel Sir JOHN MAY, Asst.-Adjt.-Gen. Captain F. BAYNES, Brigade Major.
Lieut.-Colonel Sir AUGUSTUS FRAZER, Commanding whole of R.H.A. Lieut.-Colonel Sir JULIUS HARTMANN, Comdg. King's German and Hanoverian Artillery.

Field Officers.	Troops and Brigades.	Armament.	N.-C.-O.'s and men.	To what attached.	Present designation of Waterloo Troops and Brigades.
Commanded by Lt.-Col. MacDonald, R.H.A.	Major Bull's Lt.-Col. Webber Smith's Lt.-Col. Sir R. Gardiner's Captain Whynnyates's Captain Mercer's Captain Ramsay's	Heavy 5½-inch Howitzer. " Light 6-prs. " " 6 light 6-prs. and rockets. " " 9-prs. " " 9-prs.	175 175 175 175* 175 175	Cavalry.	I Battery, A Brigade, R.H.A. F Battery, A Brigade, R.H.A. E Battery, A Brigade, R.H.A. 2nd Rocket Troop, R.H.A., reduced in 1816. G Battery, A Brigade, R.H.A. H Battery, A Brigade, R.H.A.
Lt.-Col. Aclay, R.A.	Captain Sandham's Royal British Artillery Major Kuhn's Troop, Kg's Germ. H.A.	" " " " " "	200 } 1st Div. of Infantry. 175 }		Reduced in 1819. Reduced in 1816.
Lt.-Col. Gold, R.A.	Captain Bolton's Royal British Artillery. Major Simphor's Troop, Kgs. Germ. H.A.	" " " " " "	200 } 2nd Div. of Infantry. 175 }		R Battery, 4th Brigade, R.A. Reduced in 1816.
Lt.-Col. Williamson, R.A.	Major Lloyd's Royal British Artillery Captain Cleaves's Kgs. Germ. Artillery	" " " " " "	200 } 3rd Div. of Infantry. 200 }		Reduced in 1817. Reduced in 1816.
Lt.-Col. Hawker, R.A.	Major Brown's Royal British Artillery Captain de Retberg's Hanoverian Artillery.	" " " " " "	200 } 4th Div. of Infantry. 200 }		G Battery, 4th Brigade, R.A. Reduced in 1816.
Major Heise, Han. Art.	Major Roger's Royal British Artillery Captain Braun's Hanoverian Artillery	" " " " " "	200 } 5th Div. of Infantry. 200 }		No. 8 Battery, Eastern Division, R.A. Reduced in 1816.
Major Drummond	Major Unett's Royal British Artillery Sir H. D. Ross's Troop, Royal British H.A. Major Bean's Troop, Royal British H.A. Capt. Sinclair's Bde., Royal British Artillery.	" " " " " 6-prs. " " " " " 9-prs.	200 } 6th Div. of Infantry. 175 } Reserve. 175 } 200 }		No. 5 Battery, Scottish Division, R.A. A Battery, A Brigade, R.H.A. D Battery, A Brigade, R.H.A. No. 8 Battery, Northern Division R.A.

* The June muster roll of this Troop shows a strength of 201 N.-C. Officers and men, those belonging to the Rocket Sections are probably not included in above total.

MEMO.

1st. The number of rounds of ammunition expended in the three days action were :—

16th (Quatre Bras)	1074
17th (Retreat to Mount St. Jean)	323
18th (Waterloo)	9044

Total 10441

2nd. The Troops and Brigades engaged on the 16th were :—

Major Kuhlman's, Lloyd's, Rogers; Captain Sandham's Cleeves's, de Rettberg's, Braun's.

On the 17th :—

Captain Mercer's, McDonald's,* Whinyates's (R.H.A.), Major Lloyd's, Rogers; Captain Sandham's.

3rd. The Troops and Brigades engaged on the 18th were :—

Lieut.-Colonel Sir Robert Gardiner's, Webber Smith's, Sir H. D. Ross's; Major Bull's, Bean's, Ramsay's; Captain Whinyates's, Mercer's,

and every Brigade except Major Browne's that was with the 4th Division at Hal, and Major Smith's, that did not arrive in time. Captain Whinyates fired on the 17th 21 rockets, and on the 18th 52.

NOTE.—To explain clearly what Troops and Brigades were engaged on the 18th, please refer to the return.

4th. The Troops and Brigades attached to Divisions of Infantry followed the movements of their Divisions, and were placed in position in front of them in Batteries of 12 guns each. The Troops of Horse Artillery attached to the Cavalry were put in similar manner in position, and made use of according to circumstances detached from the Cavalry. The Reserve Artillery was generally placed in action together.

Indeed, the Batteries were commonly of 12 or 18 guns each, and towards the close of the 18th were more or less brought into action where particularly required.

It will be seen from the table above that of the 15 Troops and Brigades of the Royal Artillery engaged on the eventful 18th of June, 1815, 12 are still existent; and here one cannot help remarking that when augmentations in the Regiment become necessary from time to time, were old and distinguished reduced batteries reformed instead of new cadres being created, the record of many gallant and glorious memories would be preserved and *esprit de corps* cherished and maintained thereby. The subject, it is hoped, may be given consideration should additional batteries be added to the Regiment at a future period.

* Major Norman Ramsay was transferred from K Troop in Dublin to H Troop, he appears only to have assumed command on the 18th, on which day he was killed; McDonald was Second Captain of the Troop.

AN OLD GERMAN ENGRAVING OF ARTILLERY.

BY

A. G. GREENHILL, Esq., M.A., F.R.S.

THE photo-zincographic reduction in the present number of the "Proceedings," is made from a photographic reproduction of the original engraving in the British Museum, kindly presented to the R.A. Institution by Professor Sidney Colvin, Keeper of the Prints. The subject of the engraving is called "Judith and Holofernes," and the name of the engraver is Israhel van Meckenen, whose initials will be seen on the engraving.

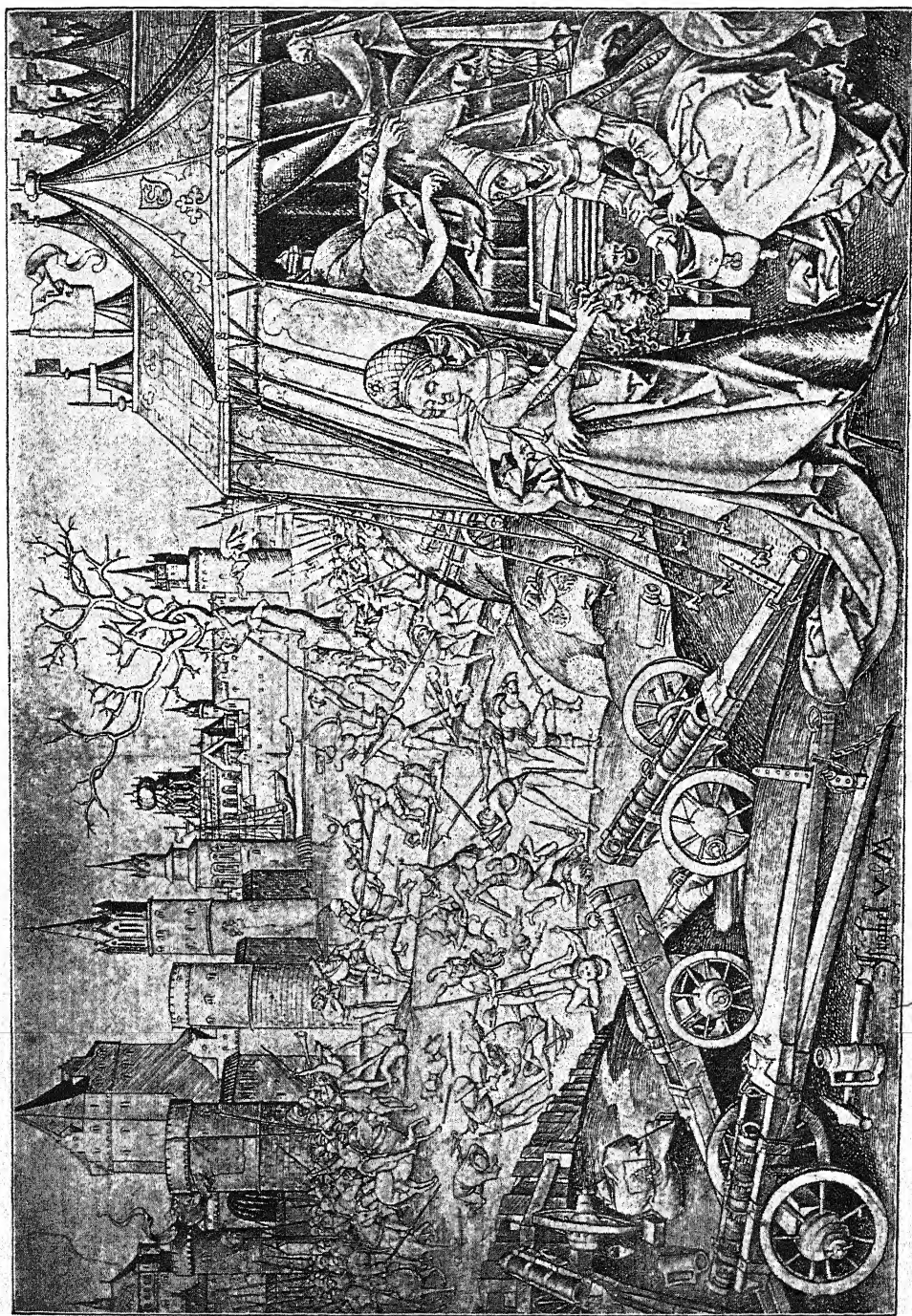
The Apocryphal version of the story of Judith and Holofernes is carefully indicated in the right-hand half of the picture; Judith is seen with the head of Holofernes in her hand, ready to place it in the bag held open by an attendant, while the body of the Assyrian General can be partially seen in the tent. The town in the background would be Bethulia, the site of which is unknown; in fact, according to the article Judith, in the *Encyclopædia Britannica*, the whole story is a Jewish romance, probably founded upon real events.

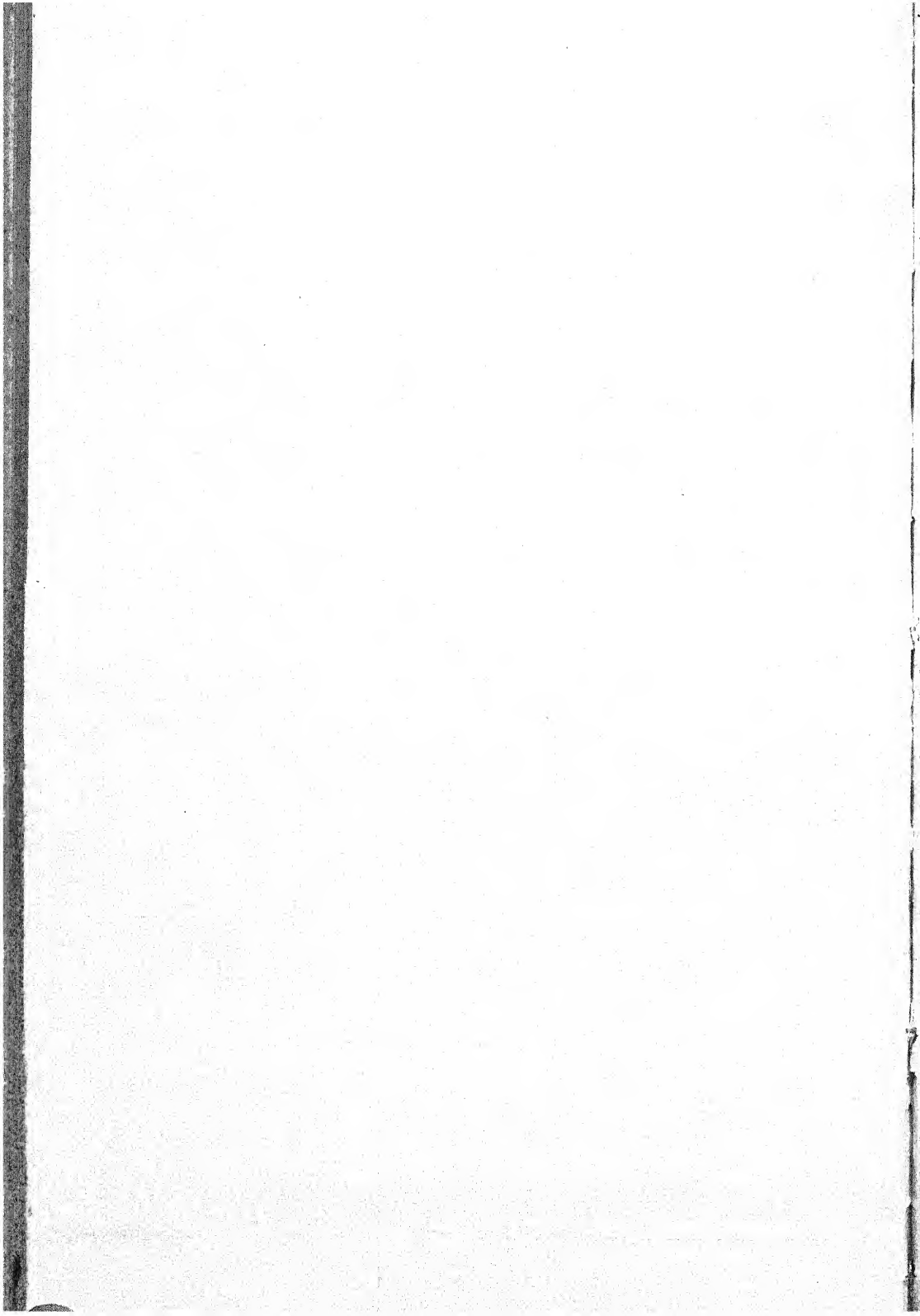
But the left-hand side of the picture is of the chief interest to the Gunner, as here we see most carefully delineated in all its details, and apparently just hastily abandoned by the besiegers, the siege artillery of the period, not of course of Judith and Holofernes, but of the period of the artist; while in the background are seen the gates and walls of a mediæval fortified city, intended by the artist, by the dome of the cathedral, to symbolize Bethulia or Jerusalem; and as a sequel to the episode of the right-hand side, the garrison are seen making a sortie from the gates, bearing the head of Holofernes aloft on a pike; two or three different epochs being thus represented in the same picture.

The engraver, Israhel van Meckenen, is known to have died about the year 1500, so that the date of this engraving is certainly to be referred to the latter half of the 15th century, say 1480 or 1490.

It is an interesting subject of enquiry to try and find out whether this engraving is not intended to symbolize some real event of these times; just as in the engravings of the *Biblia Pauperum* and their enlargements in the stained glass windows of King's College Cambridge, we see represented the type and antitype, the Old Testament episode and the New Testament fulfilment represented together; for instance, the Offering of the Golden Table in the Temple of the Sun, and the Oblation of the Virgin Mary; the visit of the Queen of Sheba to Solomon, and the Adoration of the Magi.

The "van" in van Meckenen, as with van Beethoven in the musician, points to Dutch extraction, from Meckenen in Holland; the Netherlands were the cradle of wood engraving, beginning about the date 1420, and a history of the art is given in "The Woodcutter of the Netherlands," by W. M. Conway, 1884.





The year 1475 to 1477 were remarkable for the campaigns of Charles the Bold (*le téméraire*) and the battles of Granson, Morat and Nancy; the history of which is given in De Barante's "*Historie des Ducs de Burgoyne de la maison de Valois*;" F. Lacombe's "*le Siège et la bataille de Nancy*;" and in J. F. Kirk's "*Charles the Bold*;" and it is an interesting subject of speculation to consider the subject of the engraving as an allegorical representation of some of these historical events, say the battle and siege of Nancy in 1477, at which Charles the Bold lost his life, using the heraldic emblems seen on the banners and pennons as a guide; as for instance in the serpent, the crest of Parma, and the circles representing the golden balls on the blue ground of the arms of Burgundy.

Two years before, in 1475, Charles besieged the town of Neuss, near Dusseldorf, under whose walls at that time the main stream of the Rhine used to flow; the following extract from the *Times* of 7th August, 1886, shows one of the uses to which the besieged put their artillery:—

BULLET POST.

AN INTERESTING RELIC.

"The Museum of the Berlin General Post Office received a few days since an interesting addition to its treasures. This is parchment letter found in the city archives of Cologne, which had been enclosed in a hollow bullet and fired out from the beleaguered town of Neuss in 1475, to let the friendly forces of Cologne know of the terrible plight to which the citizens were reduced. Charles the Bold of Burgundy was carrying on war against the town of Cologne and other Rhenish confederated cities, and had hemmed in Neuss so closely that the inhabitants were brought to the last extremity. An army of observation of the Confederates, posted beyond the Rhine, watched Charles's operations, hoping to get an opportunity of relieving the town. The letter is from the commander, the Landgrave Hermann, of Hesse, who describes how the besieged are destitute of food and ammunition, and have only stones for weapons, and water to live upon. They have no medicines or surgical appliances, and so the sick and wounded die without assistance. Some are for a surrender, and he fears that traitors may betray the place. They had a few days before lost 100 men in repulsing an assault of the Burgundians. The letter mentions that the besieged had previously fired off several other letters, some of which had fallen into the Rhine; and they were expending their last powder in firing off this one."

On the other hand, against this theory of allegorical representation of a real historical event in the engraving, must be set the fact that representations of artillery are common in mediæval engravings of scriptural sieges, such as of Jerusalem or Jericho, with similar cases of disregard of anachronisms; the engraver, too, Israhel van Meckenem, is found often making up the subject of an engraving by piecing together parts of different pictures. In the very case of the present engraving, the right-hand side containing the figures of Judith and Holfernes will be found exactly re-produced on the top of an engraved table, preserved in the German Museum at Nuremberg.

Again, it was the fashion in mediæval times, and lasting till a comparatively modern date, according to the account in the Vicar of Wakefield, for an artist to represent the persons in his portraits in their actual dress and surroundings, but engaged symbolically in some mythological or scriptural episode; and in this manner the anachronisms of mediæval pictures may be easily explained away.

Returning to the left-hand side of the picture, we find the siege artillery represented with very great care in all its details, the carriages and their elevating arrangement being quite clear and distinct; the guns are all breech-loaders, and the objects looking like flagons, on the ground are the spare powder chambers, the leather sacks decorated with the spread eagle, the arms of the Holy Roman Empire, containing the powder. No shot, however, are to be seen, but these guns, like the Turkish artillery defending the Dardanelles, were fired with stone shot roughly chipped to a spherical form.

Numbers of stone shot have been found in the ditch of the Tower of London, and in the river close by, supposed to have been fired from similar bombards, placed on the Surrey side, when the Tower was bombarded by Lord Shrewsbury in 1460.

The gun fished up at Spithead from the wreck of the "Mary Rose," preserved in the Rotunda, as well as the other guns from the same ship at the Tower, will be found on examination to be of exactly similar nature, except that it is mounted on a naval gun carriage slide to place on the deck, and was probably manufactured at the same place, very likely Mons. The old gun preserved at Edinburgh, Mons Meg, is supposed to derive her name from her birth-place, Mons, and appears a sister gun to Dulle Griete (= *Brown Bess*) the bombard preserved at Ghent.

The "Mary Rose," was lost in the engagement with the French fleet at Spithead in 1545, by having her port-sills too close to the water; and heeling over in wearing, the water entered the ports and filled her. The representation of this episode is given in Holbein's picture, formerly at Cowdray, but now destroyed by fire, an engraving of which hangs on the staircase in the Royal Artillery Mess, Woolwich, and gives also many other curious representations of military and naval antiquities.

Those who are curious about Ancient Artillery and its History, would do well to study Loredan Larchey's "Recherches sur l'artillerie," and Lacombe's "Les armes et les armures"; also the articles of Lieut. (now Maj.-General) Henry Brackenbury, R.A., and of Sir J. H. Lefroy, in Vols. IV., V., and VI. of the "Proceedings" of the Royal Artillery Institution; which describe, among other curiosities, the old bombards still to be seen at the seagates of Mont. St. Michel, where they were abandoned by the English under Lord Scyles about 1423, after an ineffectual siege. More recently, articles are to be found on this subject by Hue; "Journal des Sciences Militaires," 1880; "Artillerie de moyen âge," and in the Italian and Spanish Artillery Journals of 1886 and 1887; while interesting collections of old guns and stone shot are to be seen at the Rotunda, Woolwich, and also at the "Musée de la porte de Hal," Brussels, the catalogues of which are in the R.A. Institution Library.

riding in time of peace, and the consequence of this was that on the day after the battle only a very small proportion of the field-officers and adjutants of the whole of the infantry of the Guard were available for duty. The greater part of them were killed or wounded. This was very honourable to them, but was not necessary, and was of very serious consequence to the army and the Father-land.

When one reflects on these matters in the study, it all appears self-evident, and one wonders how such unreasonable proceedings can have happened. But there must have been some reason for their happening so generally, and, if we wish to avoid their terrible consequences, it is well worth while to investigate this reason.

These unreasonable proceedings arise, in the first place, from the fact that the officer commanding a battalion, when he begins to practice the exercises, cannot possibly remain at that point which he must occupy in action, namely near the company which he intends to be the last to engage. For he finds occasion at every moment to go forward to instruct and correct, and has to ride about here and there, while even when he tries to go back to his proper position, something immediately happens in the fighting-line which calls for his presence. He therefore prefers to remain in the front. It would theoretically be better if he let the faults pass, and delayed his correction and instruction until the "stand easy," or even till after the exercises were over. But this is not practicable. He would then find so much to say that he would have to be perpetually interrupting the exercises, in order to lecture his assembled officers for hours together, and would be sorely tempted to put off all his remarks until the next morning before they started for the drill-ground; if he did this he would find at the end of his speech that the whole of the time available for drill had flown by, and he would be obliged to let the men go to their dinners; I once actually saw this. Moreover, a few words, at the moment, are more convincing and instructive than the very best and longest theoretical dissertation delivered after the event. Again, if the officer commanding a battalion is to observe and correct every fault, he must be near the fighting-line. For example, if he remains near the reserve, he cannot hear faulty orders as to the description of fire, nor can he see if the men hold their rifles properly. Thus it comes about that the officer commanding a battalion is compelled, during the first days of the exercises, to stand where he could not possibly remain in action; it so becomes a habit with him. The only day, therefore, during which he can himself move as he would in action, is that of the inspection. But it is asking very much of any man to require him to give up on this one day all that has become habitual to him, and to demand, which is even more, that on this one occasion he shall adopt a new mechanism of command of his troops, at the very time when he is called upon to show how much he has taught them, and when he must be most desirous that no faults shall be committed. You may perhaps urge that the officer commanding a battalion should be allowed at first, when he is practising elementary drills, to move about as he likes, but that he should, during the second half of the training, always, when practising movements for battle, station himself at that point where he would be in action. This idea is excellent, but it is impossible of execution. The time allotted to battalion exercises is so short, that the Lieut.-Colonel may think himself lucky if he can work once through all that is in the regulations. Moreover he cannot divide the days which are allowed for battalion exercises

into two exact halves, during the former of which he may practice elementary drills, while the latter may be given up to the practical application of drill. For if out of the three weeks which are allotted to battalion exercises, from which we must deduct Sundays and holidays (as well as all days taken up by garrison duty, guards, and fatigues), he can manage to get 10 days for drill, he will have done very well. No officers commanding battalions who have tried to carry out this plan have succeeded in getting more than two days for exercises under service conditions, namely, the day of the inspection and that which precedes it. From this it soon came to pass that on the day before the inspection they attempted only such movements as they intended to show to the inspector, and the inspection thus sank to the level of a rehearsed performance, a kind of military ballet, so that both days practically lost all value for instruction under service conditions.

The inclination of battalion commanders to be everywhere and to do everything themselves will be increased by the obvious certainty that the inspecting officer will hold them responsible for every fault. It is only necessary that he should once or twice say something like; "Look, Colonel, how the *nth.* company is formed!" or, "But the skirmishers of the *x.* section are advancing by rushes; that is quite wrong!" and the Lieut.-Colonel will at once begin to gallop about from one section to another, in order to be in time to prevent the recurrence of anything of the sort.

There are even many commanders of battalions who, in their exercises under service conditions, hardly go at all beyond the paras. 77 to 98, and rarely venture into the 4th chapter of the drill regulations. What is laid down in the above paras. they carry out with perfect precision, and the battalion makes so good an impression, that a few imperfections in the contents of the 4th chapter are easily forgiven. But this is a backsliding into stiff drill and the tactics of masses, such as does not conform to the improvements in fire-arms, and can only lead to colossal losses.

I have often heard "working up for inspection" bitterly blamed. But if ever any blame was undeserved it is this, since the power of a body of troops is based upon their striving after an object by the direction of a single will, that is to say on obedience and discipline; not however on that rigid discipline which does only what it is ordered and waits for the order, but on such as meets the order half-way and endeavours to ascertain and anticipate the wishes of its superiors. He therefore who exerts himself to show his troops at the inspection as nearly as possible as the superior officer would wish to see them does no mere eye-service, but practices exactly that correct obedience which has made our army great.

I have witnessed very remarkable consequences from this craving to do everything one-self. I have, I think, already once told you how, during a reconnaissance fight of a single battalion, the divisional General, the Brigadier, the Colonel of the regiment and the battalion commander were all present in the foremost line of skirmishers, accompanied by their Staffs and even by a reigning German Prince. Accustomed as they were to do everything themselves at inspections, and rightly considering that a battle is the highest form of inspection, these gentlemen behaved exactly as they would have done in peace. On another occasion a division was marching in close order on an enterprise against the enemy. The divisional General, with the officers

commanding the leading brigade, regiment and battalion rode immediately in rear of the extreme point of the column, and the first man who was wounded was a cavalry orderly, who fell from his horse just behind his General shot in the breast by a rifle-bullet. In addition to the disproportionate loss in senior officers, and the consequent uncertainty in the distribution of command and the conduct of the action, which such proceedings lead to, they have other pernicious consequences.

Each individual has only a certain amount of strength of body and of strength of nerves. If one uselessly expends one's strength of body, before there is any necessity to do so, one runs some danger of finding it wanting at the critical moment. It is just the same with regard to the nerves. No one is indifferent to danger to life. But the strength of our nerves carries us through. Generals who press forward before it is necessary into the foremost line of battle run some risk of finding their nerves fail them at the critical moment. This does not arise from a sudden spasm of fear; oh no! Shattered nerves do not act so straightforwardly as that. They cunningly creep upon a man in the shape of tactical and strategical considerations, and prove to him that all the rules of war command him at this particular moment to delay his attack, to fall back upon the defensive, or to break off the action; or they use some other beautiful scientific expression. Take, for example, a General commanding a division who has been with the foremost skirmishers from day-break till noon, and has heard the bullets whistle for 5 or 6 hours, whilst the battalion of the advanced guard has been driving in the enemy's outposts, and who at last finds himself in presence of the enemy's main position, where the foe is awaiting him in order of battle, being perhaps obliged to stand there, because he is afraid that he will not be able to effect any further retreat. A General so placed is easily inclined to believe that the troops are tired, because he is weary himself, and that they have done enough, because he himself has been for 6 hours under fire; while as a matter of fact it is only the leading battalion which is fatigued. He decides then to put off the attack until the next day, when the neighbouring divisions may have come up nearer to him; so he places outposts and bivouacs his troops, and the enemy whom he had surprised is thus surprised again, but this time pleasantly. For he so gains time to draw off without loss, and escapes the catastrophe which threatened him. If this General had spared himself more personally, if he had not already been for 6 hours in the thick of the skirmish, and if at the very moment when he actually broke off the fight he had been present with his fresh and intact main-body, he himself being fresh and not having yet been under fire, he would have taken quite a different view of the matter and would have ordered a general attack. Thus the misplaced and exaggerated energy, which will insist on looking after even the smallest things, may be the cause of an absence of true energy, and courage which is premature may result in indecision in the conduct of an action.

Such faulty behaviour of Generals in action ceased altogether towards the end of our last lengthy campaign. After the war it was also at first given up on the drill-ground. But it has gradually come in again, and threatens to become more and more habitual as the peace lasts longer, not only because the duties of peace-service, which find their full expression at the inspection, tend to become habits, but also because

the experience of war diminishes. A chamber-student of the Art of War once said, amid general laughter; "Experience of war has only a conditional value." But to a certain extent he was right. In war each grade in rank gains experience only for itself and for the grade above it. Thus an officer commanding a company learns his own work and that of a battalion commander, but nothing whatever concerning the direction or the command of regiments or brigades. The only exception is to be found in the case of such young officers as have served on the general or divisional Staff as aides-de-camps; they, if they keep their eyes open, see war from a higher standpoint. But now, after 13 years of peace, there has been a good deal of promotion, and I cannot help hoping, for the sake of the younger generation, that we may soon have no more battalion commanders who took part in the last war in the rank of Captains of companies. But how can a Subaltern, who commanded a section of skirmishers during the war, have gained any experience to teach him how he should carry out his work when he is in command of a battalion?

If he has now to command a battalion, he will do it in such a manner as he knows would satisfy an inspecting general.

Having shown that there is a tendency to work battalions in a manner which would be impossible in war, that there is too great a rigidity of formation, many unreasonable modes of proceeding and a very unpractical mechanism of command, the question arises as to how these evils are to be overcome. For fear that this letter may grow too long, I will postpone the discussion of this question to my next. I will to-day urge only one point, namely, that a strict rule should be made that all officers, from the highest to the lowest, should, both at inspections and at the manœuvres, be allowed to post themselves in such positions only as they would be able to occupy in actual war.

9th Letter.

THE INSPECTION OF A BATTALION.

YOU do me wrong when you accuse me of having given too much blame with regard to the command of a battalion and too little with respect to that of a company; and when from this fact you draw the conclusion that I thus assist to exalt the duties of the younger and junior officers above those of the officers commanding their battalions, I am compelled to distinctly deny that I do so. On this subject you very rightly observe that the battalion commanders have themselves formerly been company officers. Even though I found something to blame in the customs of our system of battalion instruction, this has no reference to the battalion commanders personally, nor can it lower them in the eyes of their juniors, for they must have been sufficiently intelligent and capable to be selected to command battalions; otherwise they would have remained Captains. Moreover they have a longer experience than the others.

Again, when I think that I can see some faults which generally exist, this is only another way of saying that it is much harder to instruct a battalion than a company on service principles. The latter certainly calls for more industry, assiduity, time and strength, but the training of the former is far more difficult, even if it be possible to carry it out in the time available. In order to train a company it is sufficient if we find, in addition to sound common sense, such knowledge as is needed in the rank of Captain, the feeling of honour which all officers possess, industry, conscientiousness and a faithful discharge of duties. But this is not enough for a battalion commander. He must be skilful in apportioning and making use of the time available. This requires greater endowments and more natural talent.

Let us see now whether there are not some means of overcoming the evils of which I have spoken. The numerous attempts which have been made to remedy them show that others have recognised their existence; or if they have not expressly recognised them they have at least felt them deeply. Even in the middle of the present century we gave up the old fashion of using in the battalion exercises merely elementary tactical movements in rigid formations, and of limiting them to wheels, the manual exercise, column formations, facings, deployments, movements to the front and oblique movements, of doing very little skirmishing and that by whole battalions, and finally of making the march-past the great criterion of excellence. Battalion commanders, who were being inspected, were permitted at the close of the exercises to make movements, such as would be used in battle, which they had themselves thought out, and which were not included in the regulations. This made the field-officers pay attention to such matters, and they often brought forward new and good ideas. Anyone who suggested something of this kind, even if was not accepted

as altogether practical, gained at least the credit of being a man of original mind. This very soon got beyond reasonable limits. Everyone wanted to invent something, and tried to keep his discovery secret up to the time of the inspection of his battalion, while after it he brooded during the whole year over how at the next he might show something yet more marvellous. The most extraordinary fancies sometimes appeared, of which one of the least wonderful was the celebrated river which was marked out by men posted across the drill-ground, this being perhaps on the top of a hill. These movements, on account of the disorder which they always produced, were soon known by the name of "Turkish Manceuvres," or for short as "Turks." The fact that each battalion commander was permitted to carry out his "Turk" under the eyes of the inspector tended very much to destroy the authority of the regulations, since everyone believed that, when he should come into a real action, he would be allowed, and even that he ought, to throw over at once all the directions given in the regulations. The precision of the regulation movements thus tended to decrease, and with this discipline began to get slack. The saying of the old drill-instructor, which had its origin at that time; "The march-past, gentlemen, is, like painting on glass, a lost art"; expressed somewhat originally the recognition of this evil.

After a few years then efforts were made in high places to repress the increasing tendency to wander from the regulations and invent new fancies, and it was strictly laid down that when "Turks" were carried out, such movements only were to be made as were to be found in the regulations.

The use of company columns in combination with fighting in extended order was from time to time developed by supplementary orders.

After our experiences in war, especially those of 1870-71, it was permitted, for a certain time, to bring forward various propositions practically on the drill-ground. These principally endeavoured to find a solution for the problem, how to advance to the attack over open ground which was under the fire of the enemy. The most marvellous formations again appeared. Sometimes the whole drill-ground, for a length and breadth of 300 paces, might be seen dotted with files each of two men, and it was impossible to help the feeling creeping over one, that in this case a general "skedaddle" was being elevated into a system. You might see battalions doubling until they lost their breath, and even until they tumbled down, and then begin to fire in such a state of excitement that there was very good reason to doubt whether even a single shot could possibly hit its mark. You might even see thick swarms of skirmishers firing as they ran, holding their rifles horizontally at the hip. An enormous mass of literature full of suggestions turned the heads of such officers as thought about the matter, until at length they had no longer any idea as to what they had read in these pamphlets and what was laid down in the regulations.

The new edition of the drill-regulations, on the 1st of March, 1876, put an end to this state of uncertainty.

The 4th and 5th chapters of these regulations are sufficient for all exigencies of war, and permit (as I have already mentioned), owing to the elasticity of their directions, the infantry to be led under all circumstances in accordance with the character of the action and the nature of the ground.

How shall we now ensure that, during the long peace, we shall not fall back again into rigidity, and seek in the sections of the 3rd chapter the one chief aim of our system of instruction ?

I will now speak of the day of inspection. For as troops are inspected, so they will be drilled. At least the discipline of our army is still, thank God, so good, that this result is certain.

The inspection of a battalion is in general carried out by employing a part of the time, after the parade and the march-past, on the 3rd and part on the 4th chapter of the regulations. As a rule the inspecting officer states how much of the 3rd chapter he wishes to see, and leaves it to the battalion commander to arrange an action in accordance with the 4th chapter ; he however sometimes leaves the selection from both chapters to the battalion commander. The consequence of this is that as far as regards the second part, which is generally called the "fighting exercise," the battalion commander exerts himself to show how he thinks that the battalion may best be handled in action. For this reason he arranges everything so that not even a single skirmisher shall move otherwise than as he wishes. He will therefore have beforehand divided his fighting exercise (his modified "Turk") into distinct phases, and will have explained it all to his Captains, and will endeavour to prevent the smallest variation from his pre-arranged plan, for fear lest it may all fall to pieces. But this previous discussion over each phase makes the exercise a mere theatrical performance, which bears less resemblance to the reality in proportion as the officer has little previous knowledge as to how the later phases would work out in a serious action, while his endeavours to avert variations compel the battalion commander to move about into all sorts of positions where he could not be if the action were in earnest. Each of these faults destroy the independence of the junior officers, and each is thus objectionable, while there is nothing to be said for either of them, except the fact that by them the battalion is shown how it is desired that they should move in action, and that with this object errors and faults may well be prevented.

The result of this is that the fighting exercises, when they are left altogether to the battalion commander, frequently extend into scientific tactics and are even complicated with strategy, so that they, owing to the slow pace at which infantry can move, use up the time and the strength of the men to an excessive extent. This applies especially to the inclination, which is good enough in principle, to make use of the effect of flank movements. For the battalion commander will not allow the company which has been told off to attack the enemy in flank to make an entirely impossible flank movement within the reach of the enemy's annihilating fire, and must therefore detach it outside of this zone, that is to say he must, when the drill-ground is large enough, commence his attack at a distance of 2200 yards. The effect of this is that the turning force has to get over a yet greater distance, while the advance by rushes and the fire-fight, which must last some little time, will cause this single movement to take up at least half-an-hour.

Moreover the flank attack hardly ever succeeds. Either it takes place too late after the main-attack has been pressed home, or else it takes place too soon ; or again one of the two, either the main or the flank-attack, delays the other so long under a decisive fire from the enemy that its defeat is certain. For infantry have not the power which cavalry possess, of making good such differences of time by an increase

of pace. Only one form of attack in combination with a turning movement can be carried out at drill without waste of time ; this was the invention of an old General of high position. He placed from the first that company which was told off for the flank movement at right angles to the skirmishing line of the frontal attack, and made them move in this formation towards the enemy. Thus the skirmishers of the turning company marched in single file, like a flock of geese, in the direction of the enemy, while near them on the outer flank moved the company column. How this gentleman could possibly imagine that an enemy would be kind enough to allow such a flank movement I cannot understand, for such foes as I have seen him attack gave him no reason to suppose that they would be so good-natured. I certainly, in saying this transgress the maxim, "*de mortuis nil nisi bonum*," but I wanted to give you at least one proof how far the imagination may wander, if we forget that saying of Clausewitz which I have already mentioned ; "In war everything is simple, but what is simple is difficult."

When I commanded a division I made every exertion to remedy, within my sphere of action, those evils which I have mentioned, by carefully carrying out the inspections of battalions. After some attempts, which failed because the battalion commanders owing to their excess of zeal overshot the mark, I arrived at a mode of proceeding which stood every test, as I succeeded in proving during an experience of seven years. It also showed me that the battalion commanders were fully capable of training their battalions correctly, and that they had been debarred from doing so up to that time solely by the character of the inspection. I proved even more than this. I was delighted to find that, as soon as my intentions were rightly understood, my own tactical ideas were improved upon by these officers. This was only natural ; for they had been longer in the infantry than I, and had experience of every detail in war either as field-officers or as Captains. I thus learnt from those under my command. I will therefore tell you my system of inspecting a battalion, for I consider it to be the correct solution of the problem. You can try it if you like, and either adopt or reject it. I merely give you the result of my experience.

I began my inspection of a battalion, like everyone else, with a parade and a march-past. I attach great importance to these, for one can judge from the parade if the men are well set-up, and from the march-past if they set down their feet well and march without crowding ; and from this whether the instruction in details has been good. I learnt this fact by comparing what I observed at the inspections, both of recruits and companies, with what I noticed at the march-past. Again nothing shows so well the sort of treatment which the men receive as the look of their faces on parade. This may, it is true, give a false impression if the men have been without necessity kept for a long time waiting in the parade formation, and have thus become tired. In order to avoid this I used to let the battalions wait for me with piled arms, and allowed them not to take up their parade formation until I had arrived. I thus also saw how the duty was carried on. This certainly expended a little more time, but it saved the troops for the fighting exercises.

I may remark in anticipation that I also after each inspection of a battalion required a march-past in another formation. This I used as a kind of solemn conclusion and a sort of compliment to the troops, to whom I then spoke a few words of encouragement. I should have omitted this last march-past only in case I had been altogether displeased

with the battalion. But this never happened, for I everywhere found at least industry and good-will.

The parade and the march-past also form a good test as to whether the troops pay sufficient attention to the regulations.

I used after the first march-past to allow the battalion commander from half to three-quarters-of-an-hour (permitting him to use his discretion as to the distribution and succession of the drills), to display some movements from the 3rd chapter of the drill regulations, with the exception of the 16th section; this I used not to take until the end, when I had sufficiently inverted the battalion by means of the fighting exercises. It was possible to form a sufficiently good opinion in these three-quarters-of-an-hour as to whether the regulations had been thoroughly well drilled into the men, so far as such movements were concerned as could be carried out by the word of command of the battalion commander.

After a short rest I passed on to the fighting exercises.

These I carried out myself, inasmuch as I set the battalion commander some simple problems, against an enemy marked out as a rule by a couple of flags. In working these out the system of command and of direction had to be the same as it would have been in a real action. I allowed no other movements or words of command than those which are in the regulations. The Captains were to receive no more definite instructions before the beginning of the movement than were necessary to enable them to understand the supposed case and the meaning of the flags, or than might have been possible in war. The battalion commander had to remain in that position which he would have occupied in a real action. If a body of troops, who were already engaged so far that no counter-order could have got to them, did anything contrary to the original instructions, I allowed no counter-order to be given to them, but the battalion commander had to accept the fact and accommodate his ulterior dispositions to it. The description of fire (swarm volleys, the range, fire with two or three sights, the orders as to the number of cartridges to be fired, the pauses in the fire, independent fire or rapid fire) and the formations (whether in swarms, in line or in column, and what columns) were left to the junior officers concerned, who alone were responsible for them, as also for orders to lie down, to run, &c.; these also gave opportunity for me to offer them some hints.

As I set the problems it was in my power to forbid all strategy which was impossible on the drill-ground. I could also prevent the waste of too much time on any single movement, and if one threatened at any time to take too long, I could cut it short by introducing some other idea, such as a cavalry charge, or a change from the offensive to the defensive, &c. Constant practice and a set routine enabled me, in cases where I had worked out my scheme carefully beforehand, to make a battalion solve three or four problems in from three-quarters-of-an-hour to an hour. When therefore from 3 to 5 battalions were quartered in the same garrison, from 12 to 20 different tactical questions could be worked out by the same Field officers and Captains, and I thus gained the opportunity of touching upon every portion of the 4th chapter.

In order to make my meaning clearer I will name some of these problems as examples.

1. A single battalion directly attacks a certain object. (In order to save time, sometimes the action of the first 500 yards was gone through, sometimes that of the last 500).

2. A single battalion defends an object. (A redoubt, shelter-trenches or a wood).

3. A battalion acting as an advanced guard suddenly surprises the enemy; or

4. Is surprised by him.

5. The battalion has been sent against the enemy's flank, and succeeds in surprising him by getting, in attack formation, within 330 yards of him.

6. The battalion is fighting on the offensive in the centre or on the flank of a brigade, in the first or the second line.

7. The battalion, which forms the last reserve in the centre of an attack, is "*côte que côte*" to bring about the decision of a fire-fight which is swaying backwards and forwards, and to carry on to a general attack the troops which are already engaged.

8. Reinforcements to the enemy, or a flank attack from him, oblige the battalion to pass from the offensive to the defensive or to retire; and vice versa.

These eight cases alone afford more than twenty combinations, which, according to the character of the drill-ground, will offer a very great variety of exercises.

Yet more variations may be made by interposing the supposition of a charge by our own or the enemy's cavalry, or by ruling that the battalion commander is out of action. I used to order the latter, either if the battalion commander came at a wrong moment within the effective range of the enemy's fire, or if some of his Captains were among the seniors of that rank in the regiment, and I wished to give them an opportunity of showing that they were able to command a battalion.

The inspection of the exercises of a battalion, carried out in this manner, lasted about two hours and a half, and it was possible to inspect at most only two battalions in one day, since one cannot keep one's attention fixed upon every detail for longer than this. Of the 12 battalions which made up my division, five were in one garrison, three in another, two in another, while the others were quartered singly; I could thus in nine days (counting a Sunday) inspect the whole of my battalions. It was impossible to enter more closely into the details of the exercises without prolonging the period of inspection to the detriment of the time allotted to instruction, since the afternoons were taken up by the inspection of other points and in moving from garrison to garrison.

Astonishment may perhaps be expressed that all divisional commanders do not inspect after this fashion, since it has been found to be so practical. The reason of this is, that they generally prefer to work their battalions according to the fancy of the General commanding the Army-corps.

But anyone who commands a whole corps cannot give so much time to a single battalion. On an average he can afford only an hour for each battalion, and he must therefore allow the commander of it to show it to him himself.

But if I have really written to you a very old story, and if all divisional commanders inspect their battalions in the manner which I have described above, I can then only say that, in the interests of the army, I am delighted to hear it.

I have often heard the opinion expressed—and the same has been said in many pamphlets—that our system, which finishes the drill-season

with an inspection, is in some ways objectionable, since it is impossible for anyone to rightly estimate the value of a commanding officer or of his command by the single day or the single hour of inspection, while, if we hold to the system of inspections, the fate of the officers concerned depends upon one lucky or unlucky day. In place of it is suggested the French system of camps, where the superior officers live with their subordinates during the whole period of the training, and are thus able to observe them daily. But this argument is ill-grounded, for the definite opinion which one forms of an officer does not depend upon the one single day of inspection. There are many opportunities during the entire year of seeing him work in front of his men, for instance at regimental and brigade exercises, at field manoeuvres, &c., while his character as regards the preservation of discipline can be judged by looking at the defaulters' book; moreover one may see how he behaves under exceptional circumstances; this is all true, even if we omit to take into account the fact that a commander who is confident of himself and of his men is not dependent upon good or ill luck on the day of inspection. Again one's opinion of an officer is not definitely made up from the experience of a single year; he has the opportunity during several years of removing any unfavourable impression which may have been formed of him. But if he is placed in a camp of instruction and has to carry out every portion of his training, even the least important, under the eyes of his superiors, and if he thus feels himself constantly watched and criticised, he will never gain either independence or self-confidence. Past masters in any art do not fall from the skies; everyone makes mistakes at first. If he cannot keep these mistakes to himself and thus learn to avoid them, but is obliged to feel them as it were noted against him, he will never acquire any spirit of initiative. In this respect camps of instruction after the French system are not preferable to our system of inspections; I do not mention other evils inseparable from the former, which have made us hold to our plan of inspections, detachment trainings and manoeuvres.

The sort of inspection which I have proposed is in every way sufficient as a means of forming a well-grounded opinion on the capacity of a battalion commander, while, since he knows that he will be inspected in this manner, it stimulates him to train his command in such a way that his juniors will gain their necessary independence in action, while he himself will get out of the habit of misplaced (and in war impossible) interference, to which the practice of elementary drill will naturally have inclined him. To obtain this end it is necessary only that the inspecting officer shall carry out his inspection with ample kindness, for the uncertainty in which the officer inspected finds himself as to which movements will be required of him, the feeling of being examined, and the influence which the result of the inspection may have upon his future and his reputation, produce in many officers a restlessness and an embarrassment, which obscure their clear judgement; a condition of things which is commonly called "inspection-fever." It is therefore necessary to first quiet this inspection-fever, before proceeding to form an opinion. A little joke may often help to effect this. I remember a certain very excitable Field-officer, who was nevertheless very sound and sure, but who at the beginning of an inspection suffered so much from inspection-fever that he gave the first simple words of command for the march-past in a trembling voice and all wrong. I rode up to him and said in a low

tone ; "Major, I have so often seen your battalion drill beautifully under you, that in your place I should feel no fever." He at first stared at me, then laughed, and from that moment he worked his battalion faultlessly.

10th Letter.

 FORMATIONS FOR ATTACK AND FOR FLANK-ATTACKS.

IT still remains for me to discuss some few matters, which I only touched upon in my last letter.

I spoke there of "the tendency, well-founded in principle, to develope the effect of flank-attacks."

I need not here further discuss the importance of bringing a pressure upon the enemy's flank, since everyone knows, and it is strongly brought forward in the regulations, that the defender, since the recent improvements in fire-arms, can offer an unconquerable resistance against an attack which is directed against his front alone, if only he has sufficient ammunition and his men aim quietly; so long at least as he is not crushed by heavy loss in the front line. But if it be possible to succeed in taking the enemy in flank, then the victory is as good as won. The only question then is, how to take the enemy in flank.

There are but two ways; surprise or a preponderance of force. A surprise can be carried out, either by assigning different lines of advance to the troops which are directed against the front and the flank of the defenders (this I should feel inclined to call the strategic kind of flank-attack), or by skilfully making use of folds of the ground or other cover, so as to throw a portion of one's force upon the flank of the foe. But these two kinds of movement against a flank are almost impossible on the drill-ground of a battalion, since it would be very difficult to find several lines of advance, while a battalion is too small a body of troops to be divided in accordance with a strategical idea; moreover the level drill-ground of a battalion seldom affords any possibility of advancing under cover by making use of the character of the ground.

The only kind of flank-attack which can be worked out in a natural manner on the drill-ground is thus that which depends upon preponderance of strength. We must in that case suppose that the enemy is much weaker than the battalion, and must extend our own front much wider than his, in order to outflank him. As the distance between the opposing forces is lessened in the course of the attack, that part of the extended fighting-line which directly meets the enemy will be brought to a halt by the struggle, while the outflanking wing, which is not delayed, will continue to advance and will, if it keeps in contact with the rest of the line of battle, of itself wheel up to attack the flank. On the other hand, even if we assume that we have a superiority in number over the enemy, it will always on the drill-ground appear unnatural to detach parties against the enemy's flank, since, owing to the shortness of the distances at which alone it is possible to work there, this movement must be carried out under a most effective fire from the enemy's front.

For this reason I consider that we must banish from the drill-ground of a battalion every other method of attacking a flank, except by out-flanking and by the gradual wheel of the wing which out-flanks, and must thus put off the strategical method, and also that of surprise by skilfully making use of ground, to the period of the field-manceuvres and the exercises in field-service. How can we suppose a surprise to take place on the drill-ground? Such a supposition lies too open to the repartee; "But suppose the enemy refused to be surprised?" Only a real enemy, such as we have at the manceuvres, can really be surprised, and if he does actually let himself be surprised, then we may consider the effect of an attack on his flank as a direct consequence. Again the regulations lay down that on the drill-ground all the fighting formations are to be practised without taking account of the nature of the ground. If then a battalion commander sends out a company on the open and level drill-ground against the flank of a supposed or skeleton enemy, he can only make such a movement appear in any way possible in war, if he first fully explains to his battalion what is the character and the position of the particular piece of ground, which will enable an approach under cover to surprise the enemy; but in any case all this will be utterly unreal.

Another question which I just glanced at was how, considering the improvement of fire-arms, one ought to attack a locality (say a village, a wood, or a position), over a plain which gave no cover, or over open rising ground, and also what formations should be used for this purpose. I have already mentioned how many people after the last war busied themselves about this question in speech, in writing, and in experiments at the manceuvres. But all the suggestions which have been made have found more opponents than friends, and we have arrived at no definite result, though everybody was interested in it, and above all the Guard Corps, on account of the enormous losses which it incurred on the bare slope in front of the position of St. Privat. Even the regulations do not lay down any distinct instructions on this point, but only hint in a general sort of way (Para. 127, page 190), that the effect of the enemy's fire should be diminished by using the regulation formations both at the halt and when in movement, and order that, as a rule, formations when under shrapnel or shell fire shall be as shallow as possible, while when under the fire of case they shall be in small columns of narrow front, and that the men, especially when under musketry fire, shall lie down. As regards the manner of using these, the regulations leave the very greatest liberty to those who have had experience in war and have thought over such matters.

One would be certainly justified in saying that, generally speaking, one would not make a frontal attack on a position or a village, &c., over open level ground or up a bare slope. One would occupy the enemy with artillery fire, and attack at some point where the ground favoured an approach, or else one would turn the position. We should always do so, if we had the choice. But we have not always the choice. It may very well happen that a body of infantry, working in combination with other troops to the right and left of them, who have chanced on more favourable ground, absolutely *must* advance over the open. In such a case are they to say, when they receive the order to advance, that they cannot do it, *i.e.* that they do not mean to obey? The only question for them is, *how* are they to advance so as to diminish as much as possible the effect of the fire of the enemy? The regulations give no

distinct instructions on this subject, above all as to the case when this open ground is swept simultaneously by shell, shrapnel, case and infantry fire.

We must look back upon our war-experiences, if we wish to form for ourselves a decided opinion as to how we should proceed in such cases.

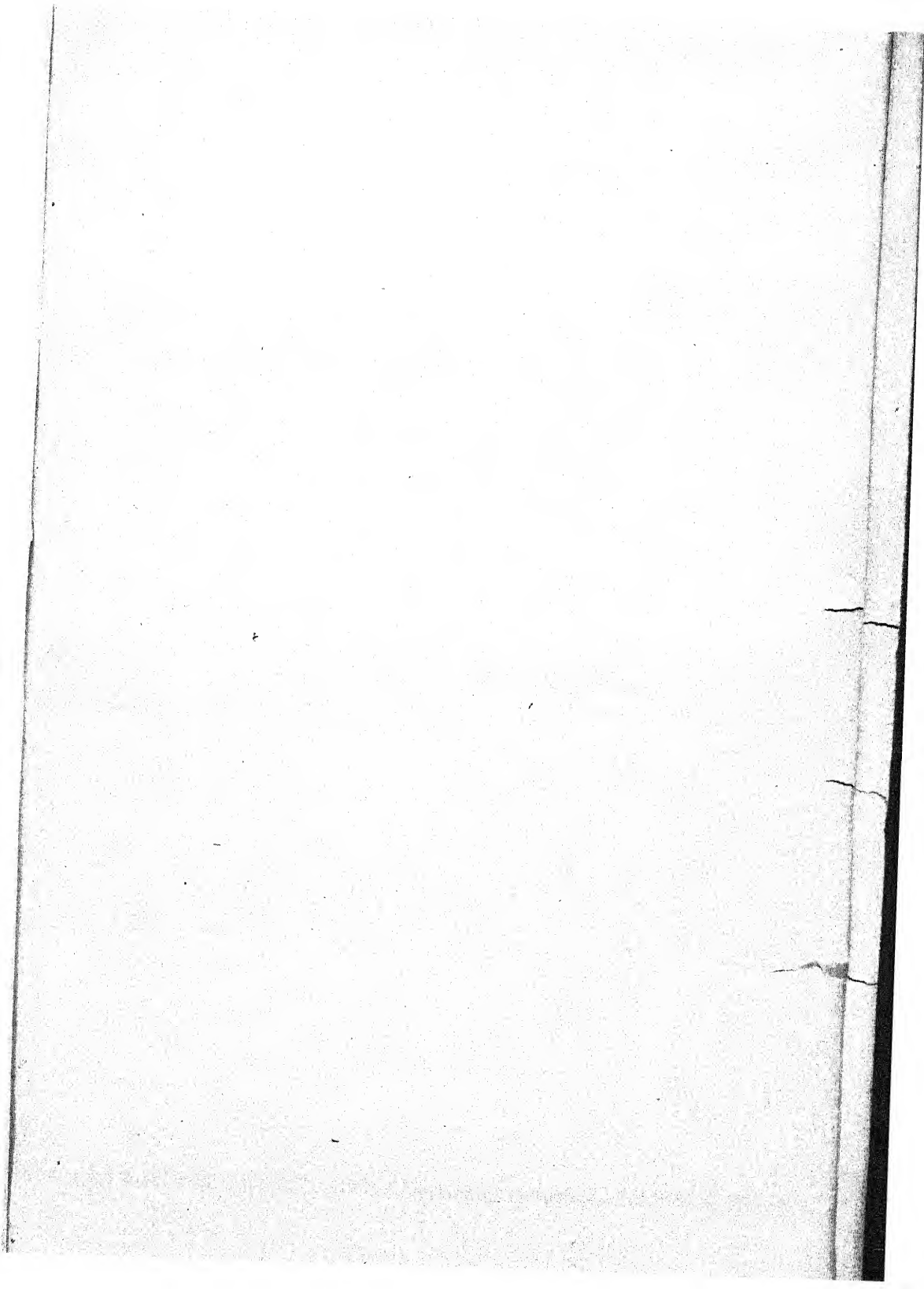
In the battle of St. Privat the infantry of the Guard-corps, as they advanced to the attack of the position, moved out of the cover afforded by the hollow which runs on the West of Ste. Marie from North to South. Formed as they still were in battle-columns, they were surprised by a very hot infantry fire at a range at which up to that time small-arms had been considered to be ineffective. The infantry certainly continued to advance, but the fearful losses, which continually increased, loosened the columns and broke up the system of command, so that, when the violence of the enemy's fire had brought the advance to a standstill, the leading troops of the attack were in swarms, which were lying down at from 500 to 600 paces from the long wall round the village, and were answering the enemy's fire. The foremost line of the infantry of the XII. Army-corps prolonged the front of the skirmishers of the infantry of the Guard to the left. Such infantry of the defenders as had been pushed forward on the bare slope had drawn back into the position, and were also, between St. Privat and Amanvillers, driven from the front crest. While part of the artillery of the attack occupied this crest, the other batteries advanced closer to the infantry, and assisted them with their concentrated fire, of which, at this short range, no shell missed. The left wing of the XII. Corps also advanced from Roncourt on St. Privat, and the assailants were thus almost in a half-circle around the village.

One of our infantry Generals, who was directing the combat in the foremost fighting line, remarked that the fire of the defenders from the loopholed walls of the gardens which lay around the village was almost silenced, and turned to his aide-de-camp with the words: "Now, get on, or we shall never take the village!" The aides-de-camp were about to ride off to carry the order in all directions, when the whole of the foremost skirmishing line, Guard-corps and XII Corps, seized with the same idea, sprang up as if an order had been conveyed by electricity, and ran in cheering on the village. This last rush, which captured the long walls about the village, cost but little loss, since it would seem that their defenders had retired into the interior of the place. It was not until we reached the houses of the village that the fight began again; it lasted some time in a hand-to-hand struggle, probably with the reserves, who were endeavouring to replace those defenders of the outer garden walls who had fallen back. This, at least, was as it appeared to me from my artillery line on the right of St. Privat. I also, on the morning after the battle, which continued after nightfall, found numbers of our dead and wounded lying over the whole field, from Ste. Marie in the direction of St. Privat. These signs of the murderous struggle increased until, at a range of from 500 to 600 paces they lay in whole ranks in a half-circle around St. Privat. Very few lay nearer than this to the village. Some of our comrades of the infantry judged from this fact that the French rifles shot too high, and that they had fired over our soldiers when they got near. But this was not the real reason. Our infantry had suffered the heaviest loss in that line, in which they had remained longest answering the enemy's fire, and had for their last rush up to the walls skilfully chosen the very moment at which the fire of the defenders was almost altogether silenced.

I have already related to you an episode of the battle of Sedan, which proved how invincible infantry are against a frontal attack, if they are unbroken, fire quietly, and have plenty of ammunition. They must therefore be broken, either by pressure on the flanks, or by fire, before one enters within their zone of effective fire.

In the battle of Sedan our attacks were carried out in accordance with this principle, which we had learned by experience. That same infantry of the Guard (though certainly other battalions), which had made the attack on St. Privat, at Sedan a fortnight later captured the Bois de la Garenne. I was standing with 90 guns of the artillery of the Guard on the edge of the valley to the East of Givonne; the line extended as far as opposite to Daigny. The enemy's artillery fire had been entirely silenced, and General von Pape determined to carry the Bois de la Garenne. He talked the matter over with me, and decided that I should continue to fire for a certain time, and that he, at a fixed hour (we compared our watches), should advance from Givonne; on this I was to cease my fire, which might else be a source of danger to his infantry. Everything was carried out exactly as we agreed. The infantry of the Guard (Jägers and Fusiliers) climbed up the hill, after my 90 guns had brought a murderous fire to bear upon the wood from a short range (the distance varied from 1200 to 1600 paces), and seized the "lisière." They captured more than 10,000 unwounded prisoners. The Fusiliers and Jägers of the Guard lost in the whole battle of Sedan only 12 officers and 216 men, and of this loss only a small proportion was due to the attack on the wood, for these same troops had already taken Givonne, and moreover after this suffered some loss in the interior of the wood. In the battle of St. Privat the infantry of the Guard lost 8000 men. But this attack on the Bois de la Garenne cannot altogether be compared with that on St. Privat, since the deep and steep valley of the Givonne allowed our men to approach unobserved to within a few hundred paces of the Bois de la Garenne, while in front of St. Privat lay a regular glacis which extended for a mile and more.

I saw another attack on a village, which had more resemblance to that on St. Privat. This was the storming of Le Bourget, on the 30th of October, 1870. The column of the left wing (the Alexander regiment and the Rifles of the Guard), accompanied by two batteries, advanced from Le Blanc Mesnil against the village. The artillery, which at last stood quite near to the village, prepared the attack. The artillery and infantry fire drove the defenders from the edge, and the swarms of skirmishers reached it almost without loss, especially at the South end of the Le Bourget. Indeed, there was not much loss, except in the house-to-house fighting in the village. The attack which the right wing carried out, between Dugny and Le Blanc Mesnil, was yet more instructive with reference to the attack-formation, since at this point the infantry attacked without the assistance of artillery. For the flank fire which the horse artillery brought to bear upon the West edge, from their position to the North of Pont-Iblon, could have produced but little effect on account of the length of the range. At this point there were two battalions of the "Franz" regiment, who had to attack over 2000 paces of open ground. The officer commanding this regiment had already practised it in the attack. In accordance with his practice he sent forward the whole of the leading line, which consisted of two companies, in thick swarms of skirmishers, and made them advance over the open ground in two parts (by wings) which alternately ran in



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